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2.0 Proposed Action and Alternatives

2.1 Proposed Action

Keystone proposes to construct and operate a crude oil transmission system from an oil supply hub near Hardisty, Alberta, Canada, to destinations in the US. The Project will have the nominal capacity to deliver 900,000 barrels per day (bpd) of crude oil.

An overview map of the Project location is provided in Figure 2.1-1. Figures 2.1-2 to 2.1-7 are maps showing the more detailed pipeline route and aboveground facilities locations in each state.

2.1.1 Project Description and Location

The Project will consist of three segments: the Steele City Segment, the Gulf Coast Segment, and the Houston Lateral. From north to south, the Steele City Segment extends from Hardisty, Alberta southeast to Steele City, Nebraska. The Gulf Coast Segment extends from Cushing, Oklahoma south to Nederland, in Jefferson County, Texas. The Houston Lateral extends from the Gulf Coast Segment in Liberty County, Texas southwest to Moore Junction, Harris County, Texas. In total, the Project will consist of approximately 1,702 miles of new, 36-inch diameter pipeline, consisting of approximately 327 miles in Canada and 1,375 miles within the US. It will interconnect with the northern and southern termini of the previously approved 298-mile-long, 36-inch diameter Keystone Cushing Extension segment of the Keystone Pipeline Project. Project facilities by State are summarized in Table 2.1-1.

Table 2.1-1 Project Facilities by State

Segment/State	New Construction Pipeline Miles	Ancillary Facilities
Steele City Segment		
Montana	282.3	7 new Pump Stations, 14 Main Line Valves (MLVs), 41 Access Roads
South Dakota	312.8	6 new Pump Stations, 13 MLVs, 22 Access Roads
Nebraska	255.2	5 new Pump Stations, 13 MLVs, Steele City tank farm, 8 Access Roads
Keystone Cushing Extension		
Kansas	0	2 new Pump Stations and 2 Access Roads
Gulf Coast Segment		
Oklahoma	154.9	4 new Pump Stations, 10 MLVs, 13 Access Roads
Texas	323.3	6 new Pump Stations, 18 MLVs, 1 Delivery Site, 86 Access Roads
Houston Lateral		
Texas – Houston Lateral	47.2	5 MLVs, 1 Delivery Site, 18 Access Roads
Total	1375.7	

2.1.2 Pipeline Construction Overview

In the US, the Project will be constructed as follows:

- 36-inch diameter Steele City Segment, approximately 850 miles in length, from the US/Canada Border at Morgan, Montana to Steele City, Nebraska, which will be constructed with seven mainline spreads, approximately 120 miles each, in 2011 and 2012.
- 36-inch diameter Gulf Coast Segment, approximately 478 miles in length, from Cushing, Oklahoma to Nederland, Texas, which will be constructed with five mainline spreads, varying in lengths from 65 to 122 miles each, in 2010 and 2011.
- 36-inch diameter Houston Lateral, approximately 47 miles in length, from Liberty County, Texas to Harris County, Texas, which will be constructed with one main spread, in 2011.

While the majority of the pipeline will be situated in rural areas, the route will traverse more populated areas near Cushing, Oklahoma, as well as Beaumont, Port Arthur, Nederland, Channelview, and Houston, Texas. The pipeline will be constructed of high-strength steel pipe (American Petroleum Institute [API] 5L) with a minimum design wall thickness of 0.463 inch. An external coating (fusion-bonded epoxy [FBE]) will be applied to the pipeline and all buried facilities. Cathodic protection will be provided by impressed current to protect against external corrosion. All pipe will be manufactured, constructed, and operated in accordance with applicable federal, state and local regulations.

2.1.3 Ancillary Facilities Summary

In addition to the pipeline, Keystone will install and operate aboveground facilities consisting of 28 new pump stations on the Steele City and Gulf Coast Segments, and two new pump stations on the Keystone Cushing Extension. These pump stations will enable the Project to maintain the pressure required to make crude oil deliveries at desired throughput volumes. Additionally, Keystone will install and operate two delivery facilities, 73 MLVs, and four densitometer facilities, all of which will be located within the permanent easement. Further, there will be check valves located on the downstream bank of major river crossings. Keystone will also install and operate a tank farm, consisting of three tanks, at Steele City, Nebraska. Metering will be installed and operated at the two delivery sites at Nederland, and Moore Junction, near Houston in Harris County, Texas.

Additional facilities such as power lines required for the pump stations, remotely operated valves, and densitometers will be installed and operated by local power providers and not by Keystone. A summary of impacts associated with the installation of the power lines is contained in Section 7 of this Environmental Report.

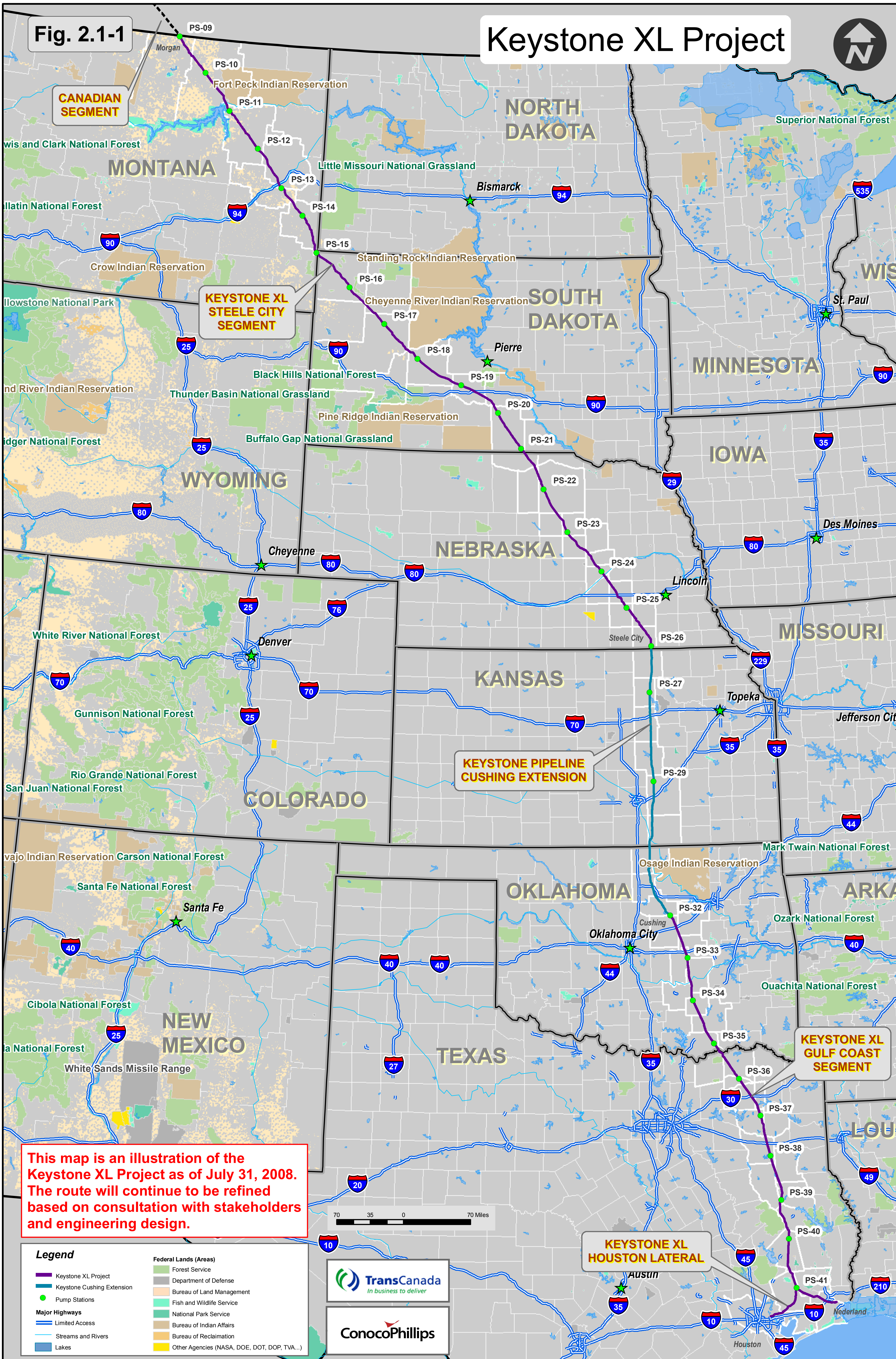


Fig. 2.1-1
Keystone XL Project
CANADIAN SEGMENT
KEYSTONE XL STEELE CITY SEGMENT
KEYSTONE PIPELINE CUSHING EXTENSION
KEYSTONE XL GULF COAST SEGMENT
KEYSTONE XL HOUSTON LATERAL
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
MINNESOTA
WYOMING
NEBRASKA
IOWA
MISSOURI
KANSAS
COLORADO
OKLAHOMA
NEW MEXICO
TEXAS
Morgan
Bismarck
Pierre
St. Paul
Cheyenne
Lincoln
Steele City
Denver
Topeka
Jefferson City
Des Moines
Santa Fe
Cushing
Oklahoma City
Austin
Houston
Nederland
Fort Peck Indian Reservation
Little Missouri National Grassland
Standing Rock Indian Reservation
Cheyenne River Indian Reservation
Crow Indian Reservation
Black Hills National Forest
Thunder Basin National Grassland
Pine Ridge Indian Reservation
Buffalo Gap National Grassland
Superior National Forest
White River National Forest
Gunnison National Forest
Rio Grande National Forest
San Juan National Forest
Santa Fe National Forest
Carson National Forest
Cibola National Forest
White Sands Missile Range
Osage Indian Reservation
Mark Twain National Forest
Ozark National Forest
Ouachita National Forest
PS-09
PS-10
PS-11
PS-12
PS-13
PS-14
PS-15
PS-16
PS-17
PS-18
PS-19
PS-20
PS-21
PS-22
PS-23
PS-24
PS-25
PS-26
PS-27
PS-29
PS-32
PS-33
PS-34
PS-35
PS-36
PS-37
PS-38
PS-39
PS-40
PS-41
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
70 35 0 70 Miles
Legend
Keystone XL Project
Keystone Cushing Extension
Pump Stations
Major Highways
Limited Access
Streams and Rivers
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips

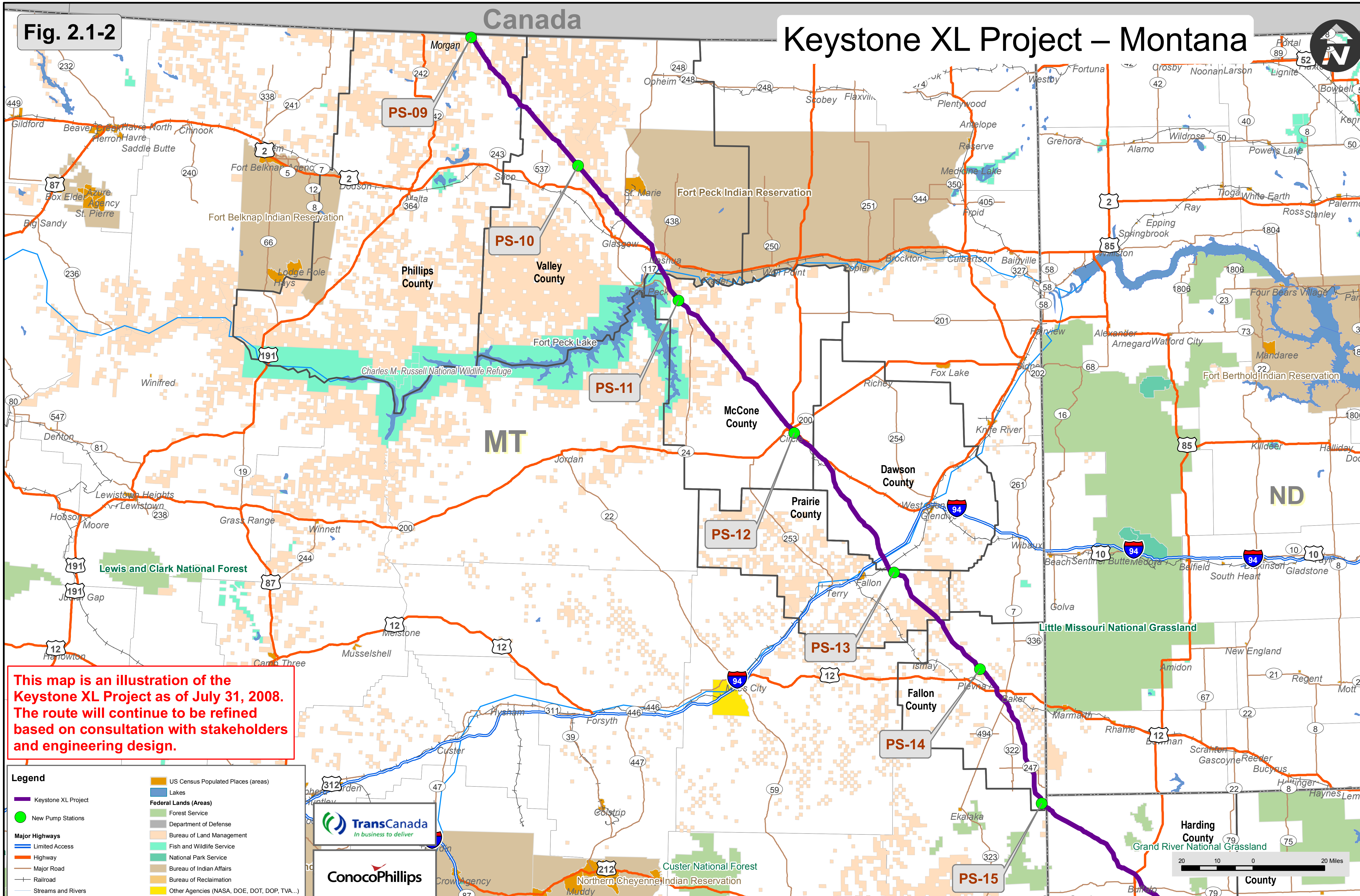


Fig. 2.1-2
Keystone XL Project – Montana
Canada
MT
ND
PS-09
PS-10
PS-11
PS-12
PS-13
PS-14
PS-15
Phillips County
Valley County
McCone County
Dawson County
Prairie County
Fallon County
Harding County
Fort Peck Indian Reservation
Fort Belknap Indian Reservation
Fort Berthold Indian Reservation
Northern Cheyenne Indian Reservation
Charles M. Russell National Wildlife Refuge
Fort Peck Lake
Lewis and Clark National Forest
Little Missouri National Grassland
Grand River National Grassland
Custer National Forest
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
Legend
Keystone XL Project
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
20 10 0 20 Miles

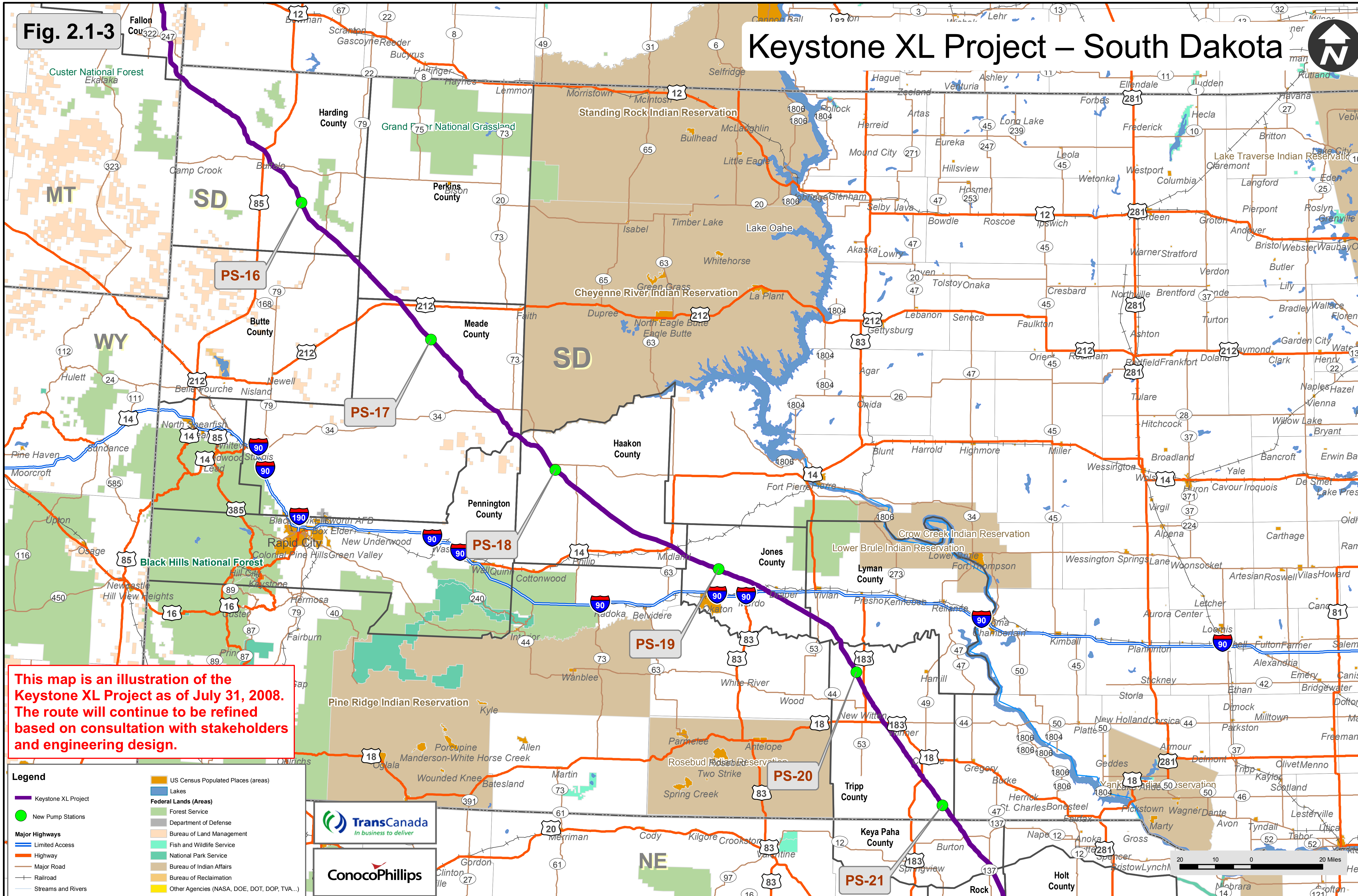


Fig. 2.1-3
Keystone XL Project – South Dakota
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
PS-16
PS-17
PS-18
PS-19
PS-20
PS-21
MT
WY
SD
NE
Harding County
Perkins County
Butte County
Meade County
Pennington County
Haakon County
Jones County
Lyman County
Tripp County
Keya Paha County
Holt County
Standing Rock Indian Reservation
Cheyenne River Indian Reservation
Pine Ridge Indian Reservation
Rosebud Indian Reservation
Crow Creek Indian Reservation
Lower Brule Indian Reservation
Lake Traverse Indian Reservation
Black Hills National Forest
Custer National Forest
Grand River National Grassland
Lake Oahe
Rapid City
Legend
Keystone XL Project
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
20 10 0 20 Miles

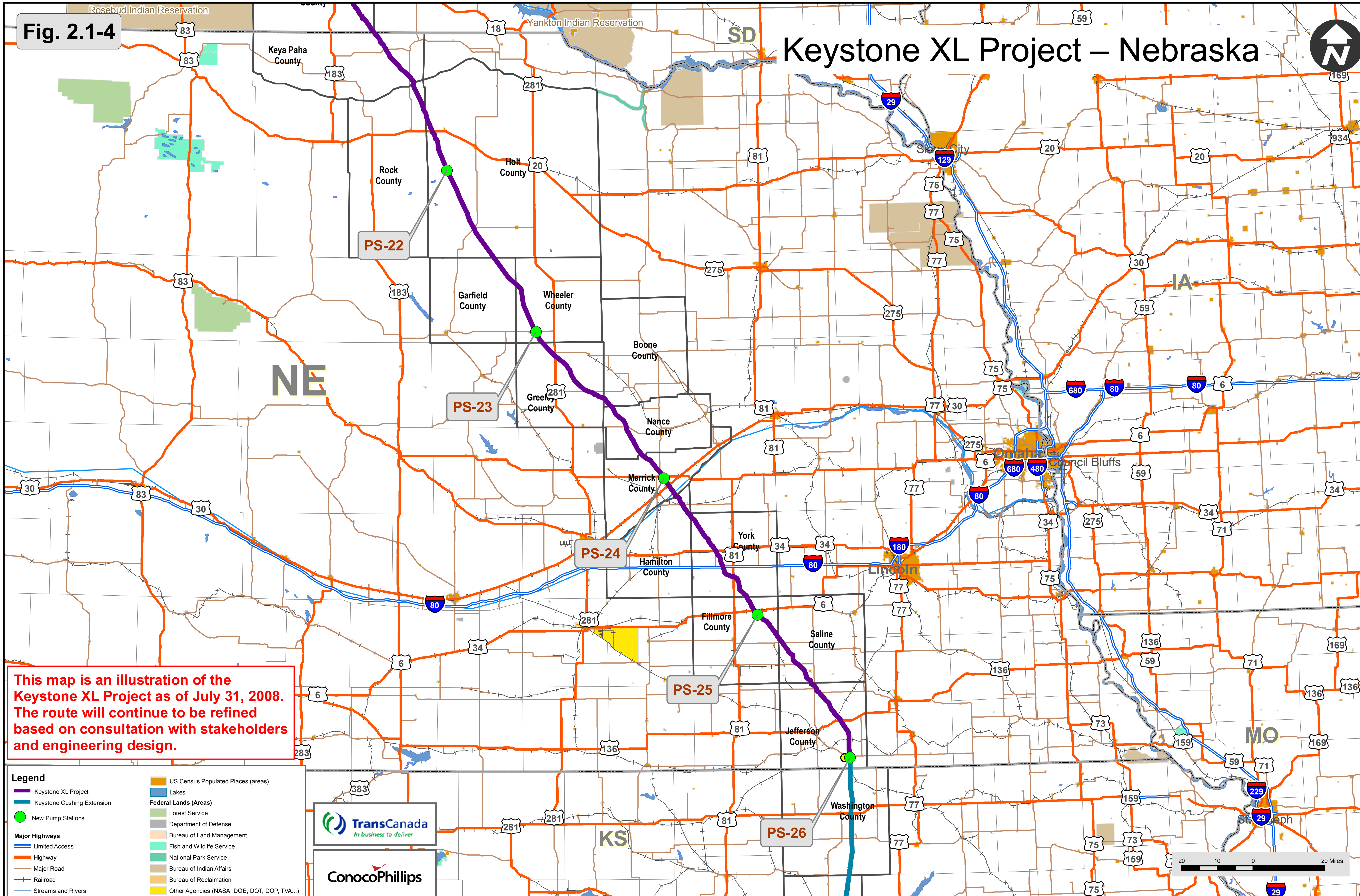


Fig. 2.1-4
Keystone XL Project – Nebraska
SD
NE
IA
MO
KS
Rosebud Indian Reservation
Yankton Indian Reservation
Keya Paha County
Rock County
Holt County
Garfield County
Wheeler County
Boone County
Greeley County
Nance County
Merrick County
Hamilton County
York County
Fillmore County
Saline County
Jefferson County
Washington County
PS-22
PS-23
PS-24
PS-25
PS-26
Sioux City
Omaha
Council Bluffs
Lincoln
St. Joseph
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
Legend
Keystone XL Project
Keystone Cushing Extension
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
20 10 0 20 Miles

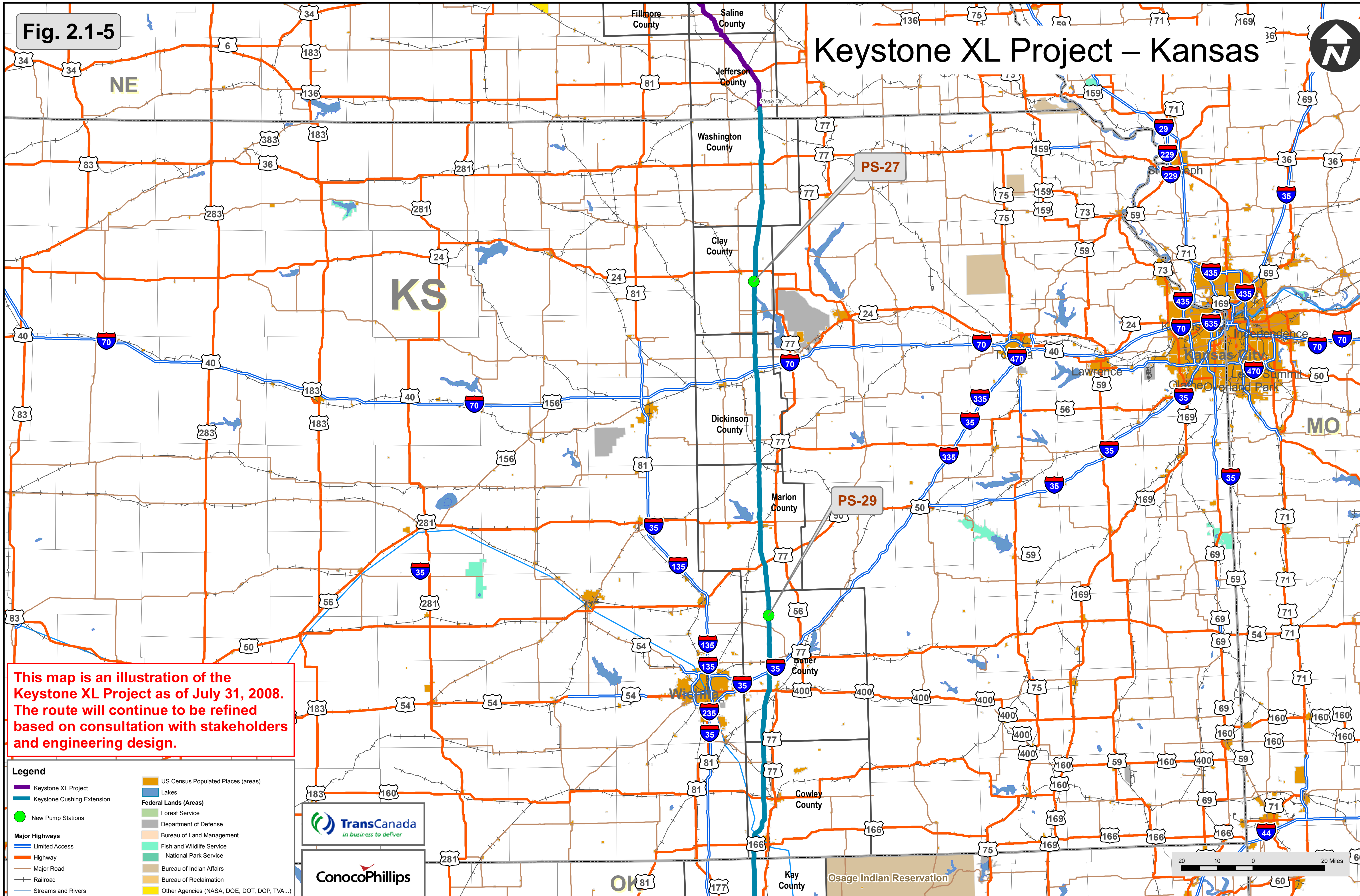


Fig. 2.1-5
Keystone XL Project – Kansas
NE
KS
MO
OK
Fillmore County
Saline County
Jefferson County
Steele City
Washington County
Clay County
Dickinson County
Marion County
Butler County
Cowley County
Kay County
Osage Indian Reservation
PS-27
PS-29
Wichita
Topeka
Lawrence
Kansas City
Independence
Lee's Summit
Overland Park
Olathe
St. Joseph
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
Legend
Keystone XL Project
Keystone Cushing Extension
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
20 10 0 20 Miles

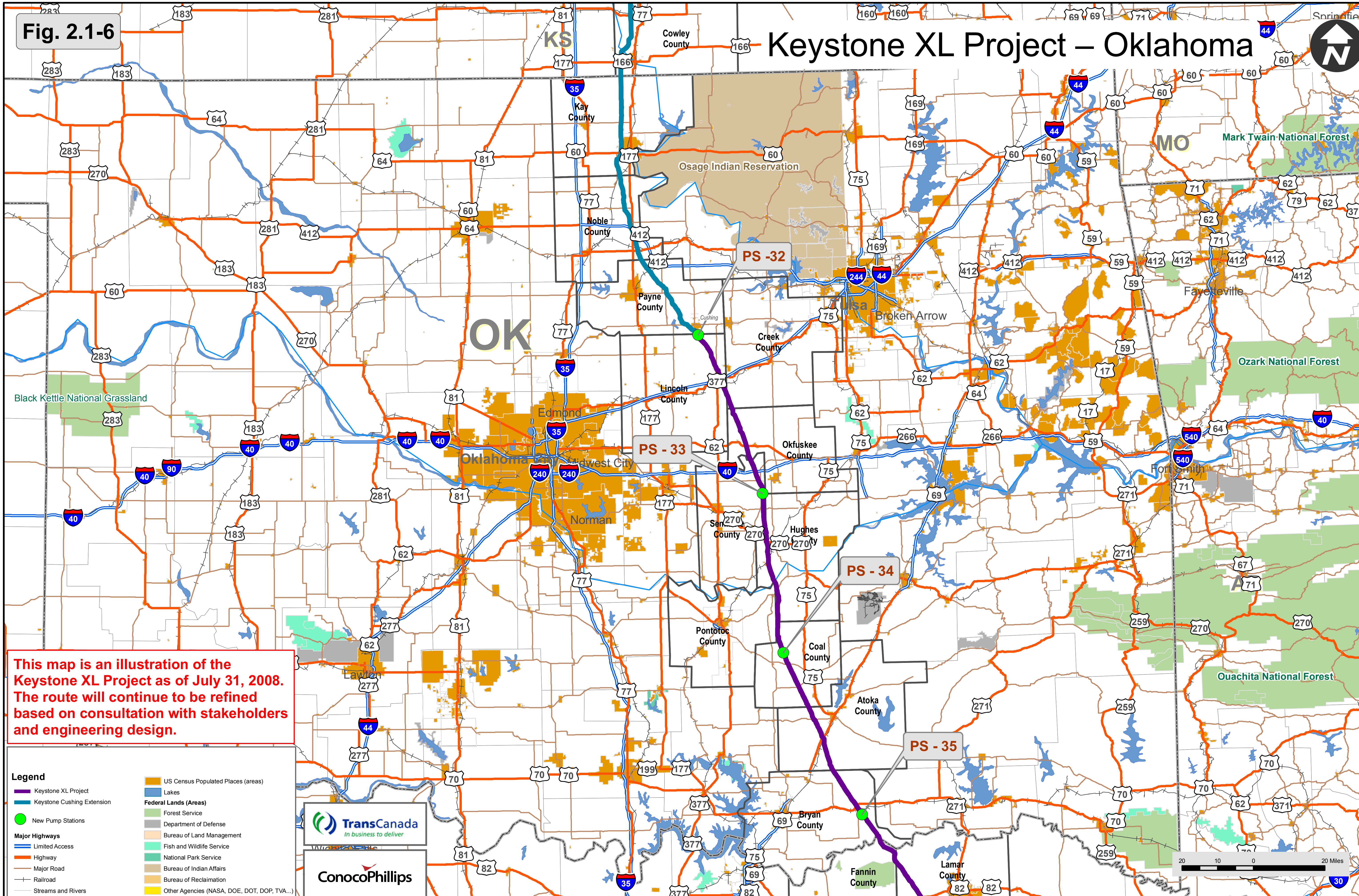


Fig. 2.1-6
Keystone XL Project – Oklahoma
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
PS -32
PS - 33
PS - 34
PS - 35
KS
OK
MO
Cowley County
Kay County
Noble County
Payne County
Creek County
Lincoln County
Okfuskee County
Hughes County
Pontotoc County
Coal County
Atoka County
Bryan County
Fannin County
Lamar County
Osage Indian Reservation
Cushing
Tulsa
Broken Arrow
Edmond
Oklahoma City
Midwest City
Norman
Lawton
Fayetteville
Fort Smith
Springfield
Black Kettle National Grassland
Mark Twain National Forest
Ozark National Forest
Ouachita National Forest
Legend
Keystone XL Project
Keystone Cushing Extension
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
20 10 0 20 Miles

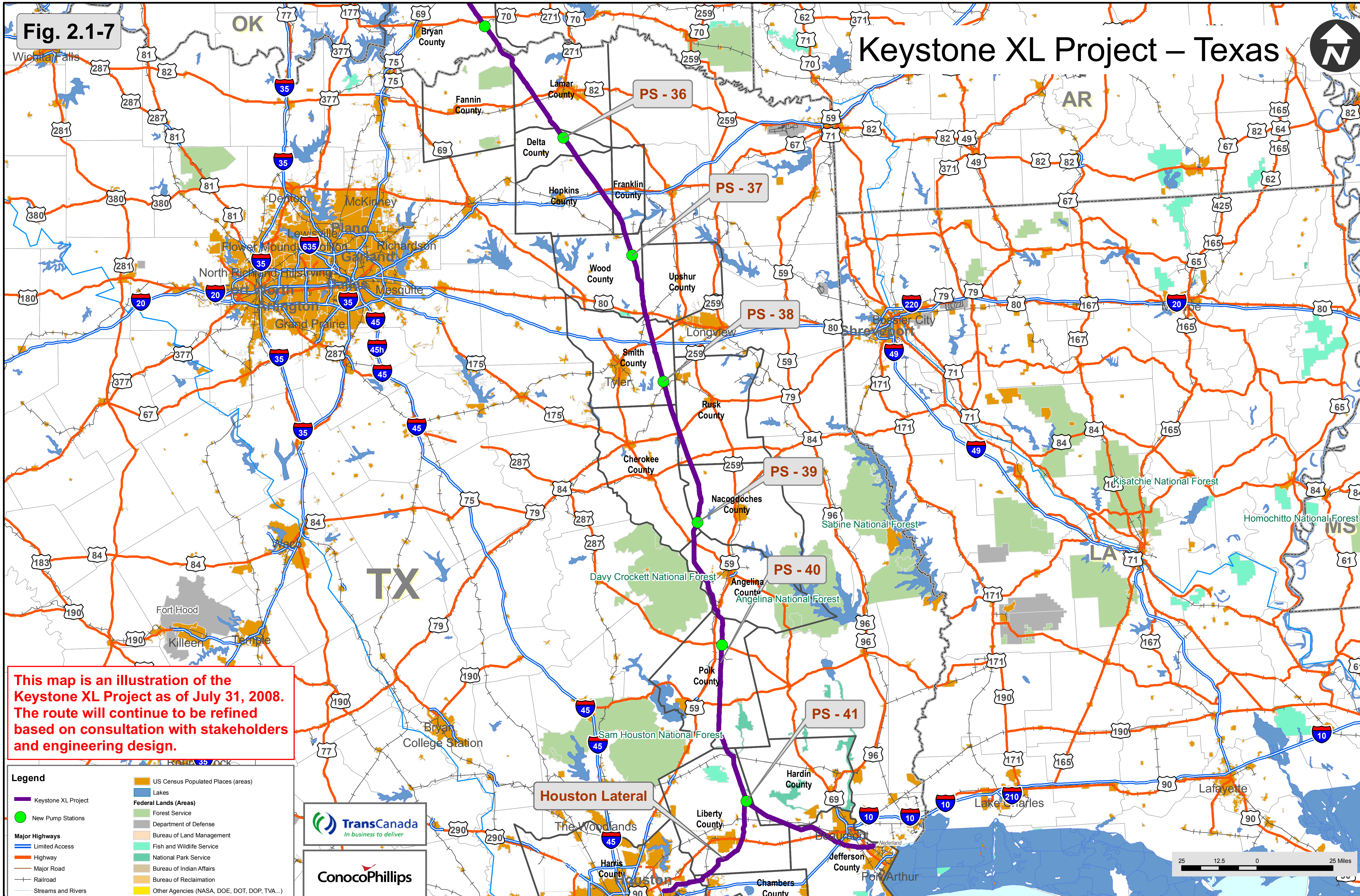


Fig. 2.1-7
Keystone XL Project – Texas
PS - 36
PS - 37
PS - 38
PS - 39
PS - 40
PS - 41
Houston Lateral
OK
AR
TX
LA
MS
Bryan County
Fannin County
Lamar County
Delta County
Hopkins County
Franklin County
Wood County
Upshur County
Smith County
Rusk County
Cherokee County
Nacogdoches County
Angelina County
Polk County
Hardin County
Liberty County
Harris County
Jefferson County
Chambers County
Wichita Falls
Denton
McKinney
Plano
Richardson
Garland
Mesquite
Grand Prairie
Longview
Tyler
Shreveport
Bossier City
Waco
Fort Hood
Killeen
Temple
Bryan
College Station
The Woodlands
Port Arthur
Lake Charles
Lafayette
Davy Crockett National Forest
Angelina National Forest
Sabine National Forest
Sam Houston National Forest
Kisatchie National Forest
Homochitto National Forest
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
Legend
Keystone XL Project
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
25 12.5 0 25 Miles

2.1.4 Land Requirements

The installation of the new 36-inch diameter pipeline will occur within a 110-foot-wide construction ROW, consisting of a 60-foot temporary easement and a 50-foot permanent easement. Figure 2.1-8 and 2.1-8a illustrate typical construction in non-co-located locations. Figures 2.1-9 through 2.1-10a illustrate the typical construction ROW and equipment work locations in areas where the pipeline will be co-located with an existing linear feature. The Project will reduce the construction ROW width to 85 feet in certain areas, which could include some wetlands, cultural sites, shelterbelts, residential areas, and commercial/industrial areas.

Surface disturbance associated with the construction and operation of the Project is summarized in Table 2.1-2. Approximately 20,782.8 acres of land will be disturbed during the construction of the proposed facilities. After construction, the temporary ROW will generally be restored and returned to its previous land use. After construction is complete, approximately 8,810.2 acres will be retained as permanent ROW. All disturbed acreage will be restored and returned to its previous aboveground land use after construction, except for approximately 206.4 acres of permanent ROW, which will not be restored but will serve to provide adequate space for aboveground facilities, including pump stations and valves, for the life of the pipeline. Impacts associated with the construction of two pump stations on the Keystone Cushing Extension include approximately 10.0 acres of land to be disturbed during construction. This acreage will be retained for permanent aboveground facilities.

Almost all of the land affected by the construction and operation of the Project will be privately owned; BLM holds the majority of the publicly owned lands. A detailed description of land ownership is presented in Section 3; Table 3.8-1.

Table 2.1-2 Summary of Lands Affected

Facility	Land Affected During Construction [1] (acres)	Land Affected During Operation[2] (acres)
Steele City Segment		
Montana		
Pipeline ROW	3,756.4	1,708.2
Additional Temporary Workspace Areas[6]	148.4	0.0
Pipe and Contractor Yards	313.3	0.0
Pump Stations/Delivery Facilities	35.1	35.1
Montana Subtotal[3,5]	*4,253.2*	*1,743.3*
South Dakota		
Pipeline ROW	4,170.6	1,893.0
Additional Temporary Workspace Areas[6]	131.7	0.0
Pipe and Contractor Yards	368.9	0.0
Pump Stations/Delivery Facilities	30.0	30.0
South Dakota Subtotal[3,5]	*4701.2*	*1,923.0*
Nebraska		
Pipeline ROW	3,402.3	1,544.3
Additional Temporary Workspace Areas[6]	116.4	NA
Pipe and Contractor Yards	295.9	NA
Pump Stations/Delivery Facilities	25.6	25.6
Tank Farm	50.0	50.0
Nebraska Subtotal[3,5]	*3,889.2*	*1,619.9*
Steele City Subtotal[3,5]	12,843.5	5,286.2

Table 2.1-2 Summary of Lands Affected

Facility	Land Affected During Construction [1] (acres)	Land Affected During Operation[2] (acres)
Keystone Cushing Extension[5]		
Kansas		
Pipeline ROW	NA	NA
Additional Temporary Workspace Areas[6]	NA	NA
Pipe and Contractor Yards	NA	NA
Pump Stations/Delivery Facilities	10.0	10.0
Kansas Subtotal [3,4,5]	*10.0*	*10.0*
Keystone Cushing Extension Subtotal[3,4, 5]	10.0	10.0
Gulf Coast Segment and Houston Lateral		
Oklahoma		
Pipeline ROW	2,032.7	936.7
Additional Temporary Workspace Areas[6]	165.2	0
Pipe and Contractor Yards	73.5	0
Pump Stations/Delivery Facilities	22.2	22.2
Oklahoma Subtotal[3, 5]	2,293.6	958.9
Texas		
Pipeline ROW	4,202.3	1,959.4
Lateral ROW	603.6	286.1
Additional Temporary Workspace Areas[6]	363.2	286.1
Pipe and Contractor Yards	433.1	0
Pump Stations/Delivery Facilities	33.5	33.5
Texas Subtotal[3]	*5,635.7*	*2,565.1*
Gulf Coast and Houston Lateral Subtotal[3]	7,929.3	3,524.0
PROJECT TOTAL[3,4, 5, 6]	**20,782.8**	**8,810.2**

[1] Disturbance is based on a total of 110-foot construction ROW for a 36-inch diameter pipe, except in certain wetlands, cultural sites, shelterbelts, residential areas, and commercial/industrial areas where an 85-foot construction ROW will be used, or in areas requiring extra width for workspace necessitated by site conditions. Disturbance also includes pipe storage and contractor yards.

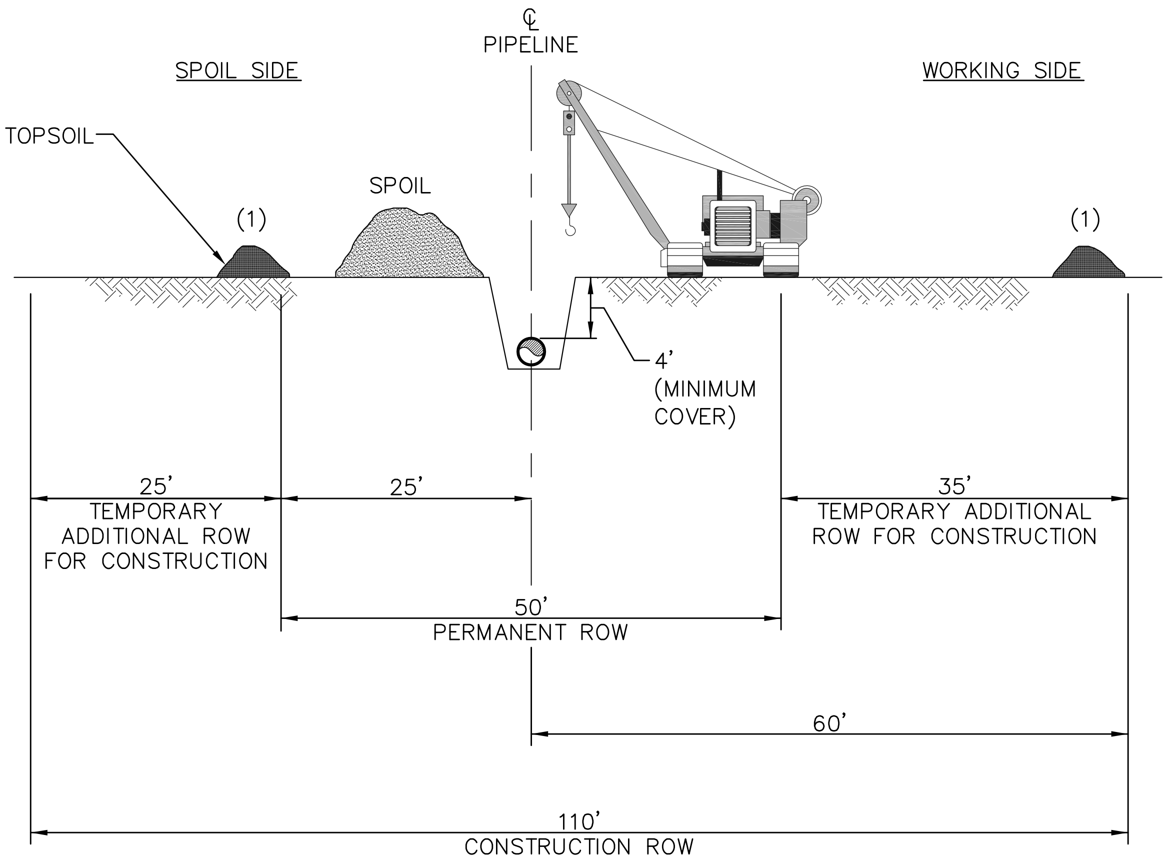
[2] Operational acreage was estimated based on a 50-foot permanent ROW in all areas. All pigging facilities will be located within either pump stations or delivery facility sites. MLVs and densitometers will be constructed within the construction easement and operated within a 50-foot by 50-foot area or 50 foot x 66 foot area, respectively, within the permanently maintained 50-foot ROW. Other MLVs, check valves and block valves, and meters will be located within the area associated with a pump station, delivery site or permanent ROW. Consequently, the acres of disturbance for these aboveground facilities are captured within the Pipeline ROW and Pump Station/Delivery Facilities categories within the table.

[3] Discrepancies in total acreages are due to rounding.

[4] Disturbance associated with the Keystone Cushing Extension in this table is for the two new pump stations to be constructed for this Project. For discussion of previously permitted disturbance associated with the construction of the Keystone Cushing Extension see TransCanada (2006).

[5] Includes disturbances associated with construction of the Steele City Segment, the Gulf Coast Segment, and the Houston Lateral. This total includes 10 acres associated with construction and operation of new pump stations along the Keystone Cushing Extension.

[6] Does not include the potential for extended additional temporary workspaces necessary for construction in rough terrain or in unstable soils. These locations are currently undergoing identification and analysis. Potential disturbance associated with these areas will be included in supplemental filings when these additional temporary work spaces are identified.



(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

REVISIONS		
1	11.05.08	REMOVED TOPSOIL NEAR TRENCH

TransCanada
In business to deliver

KEYSTONE XL PROJECT

PREPARED BY:
TROW ENGINEERING CONSULTANTS, INC.
7505 NW Tiffany Springs Pkwy., Suite 400
Northpointe Circle I
Kansas City, MO 64153
Phone: 1-816-801-7063
Fax: 1-816-801-7048
Trow

ORIGINATOR:
JOE A. NELSON — NAME
9/08/08 — DATE

CHECKED BY:
APPROVED BY:

FIGURE 2.1-8

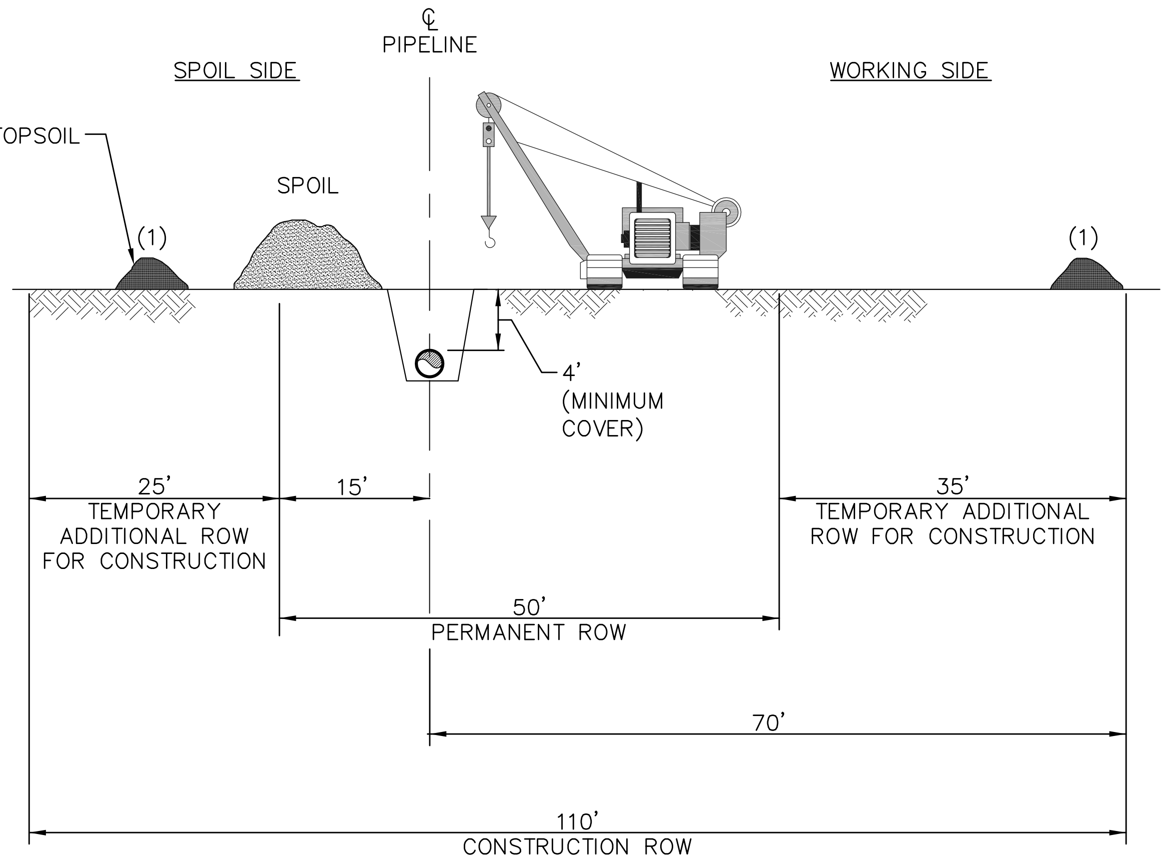
FIA #	CHAINAGE:	DISCIPLINE #

TITLE
TYPICAL 110' CONSTRUCTION RIGHT-OF-WAY
(36" PIPELINE)
WITH TOPSOIL REMOVAL ONLY OVER TRENCH LINE

SCALE	DWG No	REV
N.T.S.	XL-00-ML-7000-548	1

LAST PLOT DATE:
Wed, 05 Nov 2008 - 2:01pm

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS PLOTTED SIZE: ANSI A (8.5x11)



(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

G:\2000DraftingandGIS\CADFiles\Drawings\Typical_Details\20081104\Construction_ROW_Details.dwg 11/5/2008 10:39:38 AM CST

REVISIONS		
1	11.05.08	REMOVED TOPSOIL NEAR TRENCH

TransCanada
In business to deliver

KEYSTONE XL PROJECT

PREPARED BY:
TROW ENGINEERING CONSULTANTS, INC.
7505 NW Tiffany Springs Pkwy., Suite 400
Northpointe Circle I
Kansas City, MO 64153
Phone: 1-816-801-7063
Fax: 1-816-801-7048
Trow

ORIGINATOR:
JOE A. NELSON — NAME
9/08/08 — DATE

CHECKED BY:
APPROVED BY:

FIGURE 2.1-8a

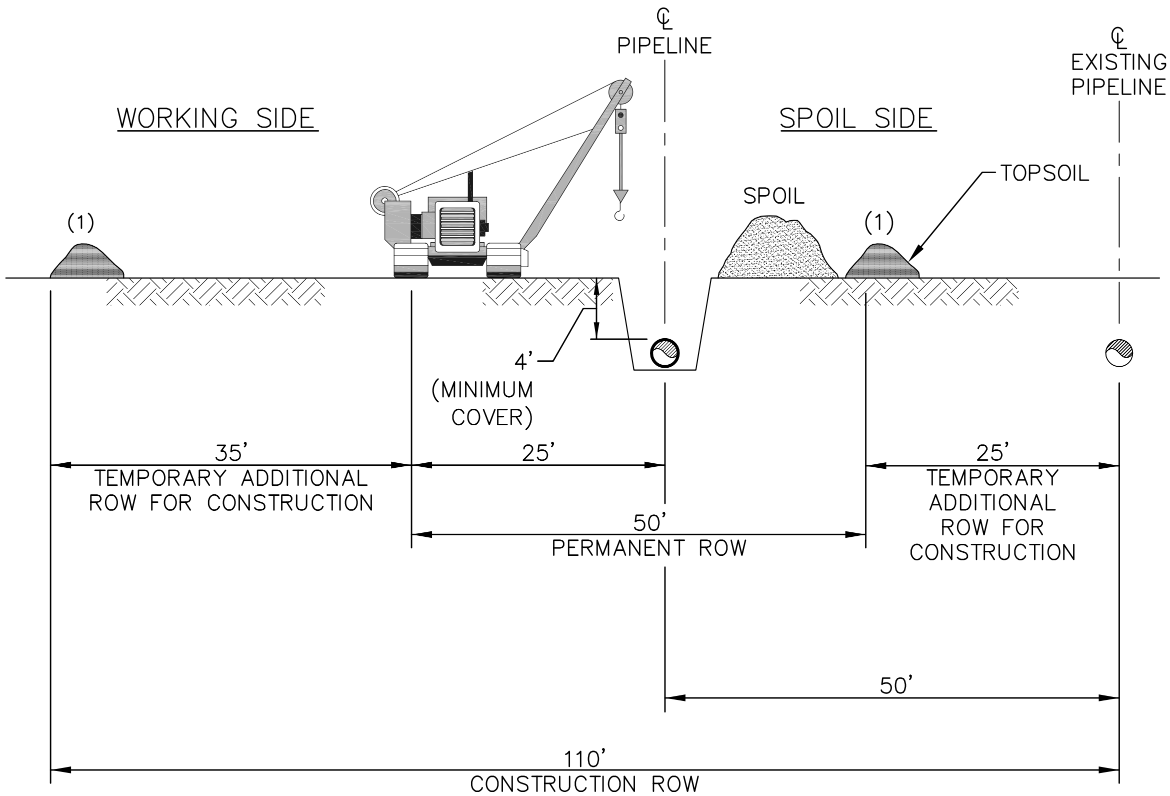
FIA #
CHAINAGE:
DISCIPLINE #

TITLE
TYPICAL 110' CONSTRUCTION RIGHT-OF-WAY
(36" PIPELINE ℄ OFFSET)
WITH TOPSOIL REMOVAL ONLY OVER TRENCH LINE

SCALE N.T.S.
DWG No XL-00-ML-7000-548
REV 1

LAST PLOT DATE:
Wed, 05 Nov 2008 - 2:02pm

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS
PLOTTED SIZE: ANSI A (8.5x11)



(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

REVISIONS | 1 | 11.05.08 | REMOVED TOPSOIL NEAR TRENCH; MODIFIED TITLE

G:\2000DraftingandGIS\CADFiles\Drawings\Typical_Details\20081104\Construction_ROW_Details.dwg 11/5/2008 10:39:38 AM CST

TransCanada
In business to deliver

KEYSTONE XL PROJECT

PREPARED BY:
TROW ENGINEERING CONSULTANTS, INC.
7505 NW Tiffany Springs Pkwy., Suite 400
Northpointe Circle I
Kansas City, MO 64153
Phone: 1-816-801-7063
Fax: 1-816-801-7048
Trow

ORIGINATOR:
JOE A. NELSON — NAME
9/08/08 — DATE
CHECKED BY:
APPROVED BY:

FIGURE 2.1-9

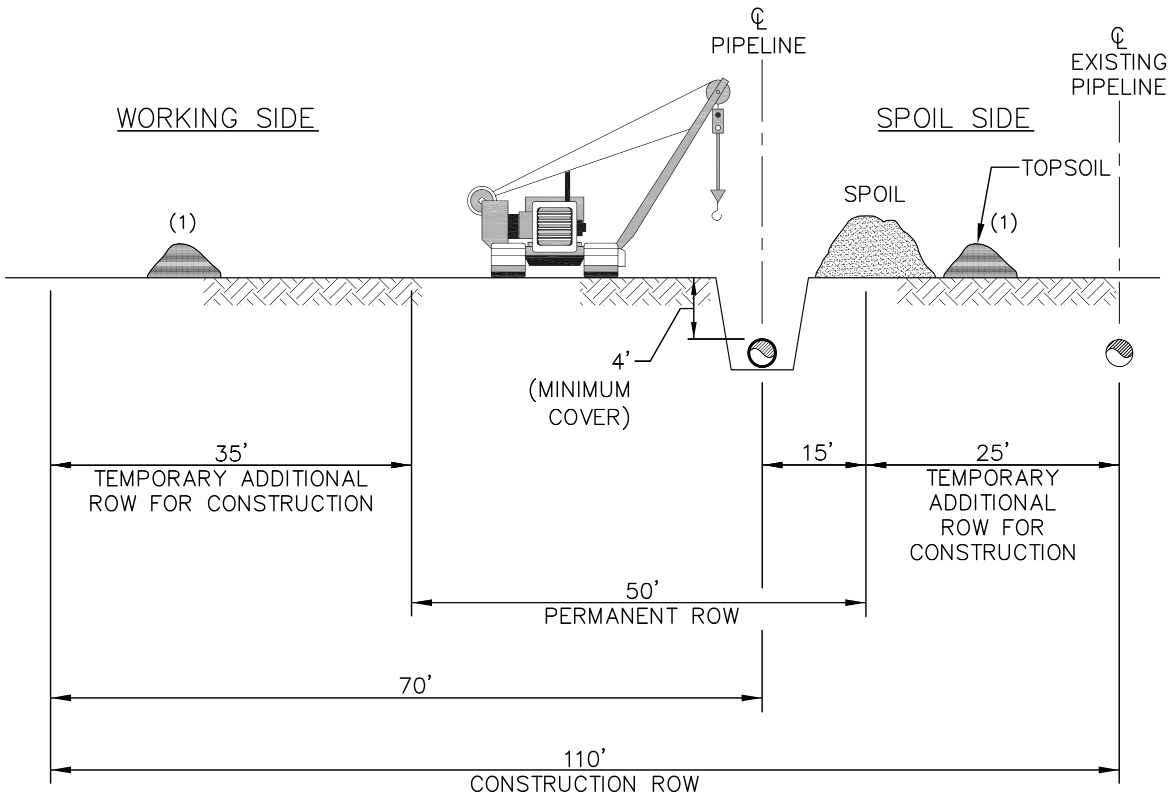
FIA #
CHAINAGE:
DISCIPLINE #

TITLE
TYPICAL 110' CONSTRUCTION RIGHT-OF-WAY (36" PIPELINE) SPOIL SIDE ADJACENT AND CO-LOCATION TO EXISTING PIPELINE

SCALE N.T.S.
DWG No XL-00-ML-7000-550
REV 1

LAST PLOT DATE:
Wed, 05 Nov 2008 - 2:02pm

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS
PLOTTED SIZE: ANSI A (8.5x11)



(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

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REVISIONS		
1	11.05.08	REMOVED TOPSOIL NEAR TRENCH; MODIFIED TITLE

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KEYSTONE XL PROJECT

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JOE A. NELSON — NAME
9/08/08 — DATE

CHECKED BY:
APPROVED BY:

FIGURE 2.1-9a

FIA #
CHAINAGE:
DISCIPLINE #

TITLE
TYPICAL 110' CONSTRUCTION RIGHT-OF-WAY
(36" PIPELINE ℄ OFFSET) SPOIL SIDE ADJACENT AND
CO-LOCATION TO EXISTING PIPELINE

SCALE N.T.S.
DWG No XL-00-ML-7000-550
REV 1

LAST PLOT DATE:
Wed, 05 Nov 2008 - 2:03pm

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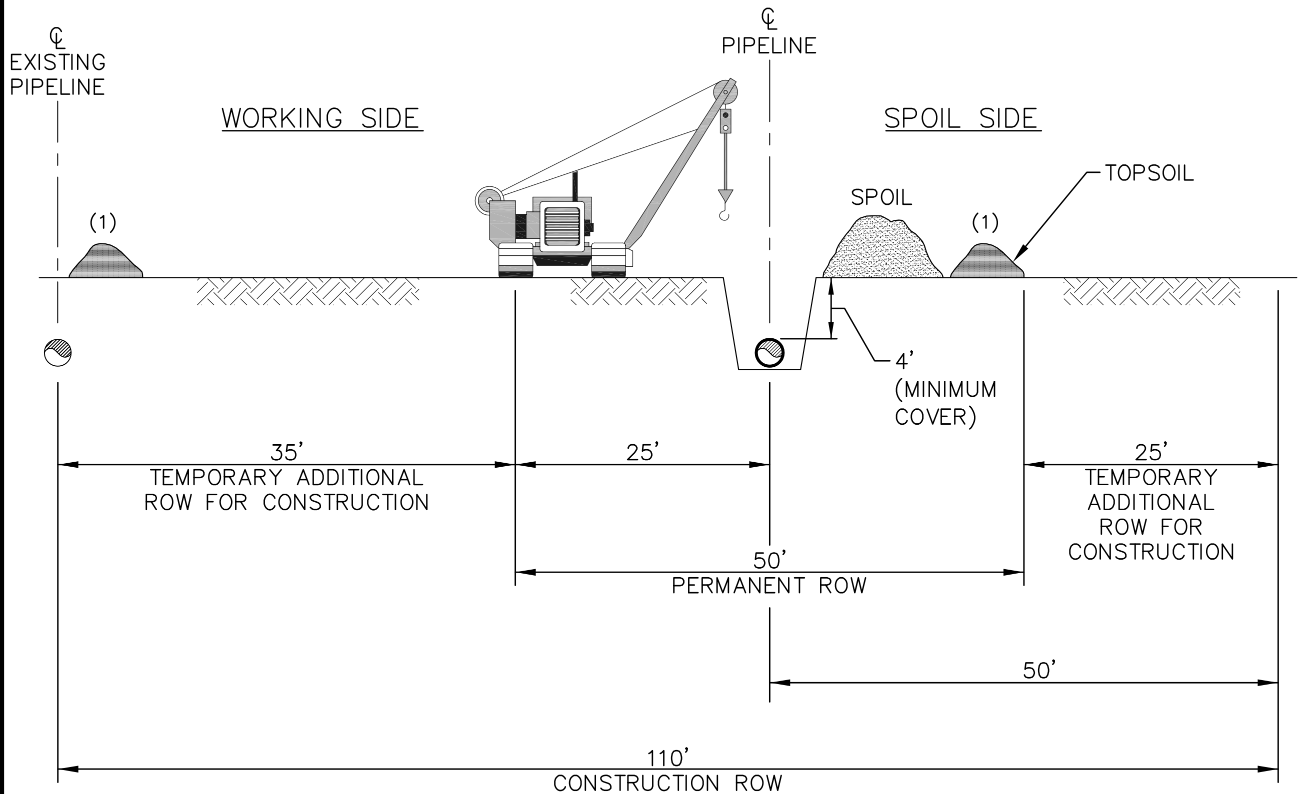

(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

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REVISIONS

1 | 11.05.08 | REMOVED TOPSOIL NEAR TRENCH; MODIFIED TITLE

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FIGURE 2.1-10

FIA #
CHAINAGE:
DISCIPLINE #

TITLE
TYPICAL 110' CONSTRUCTION RIGHT-OF-WAY (36" PIPELINE) WORKING SIDE ADJACENT AND CO-LOCATION TO EXISTING PIPELINE

SCALE N.T.S.
DWG No XL-00-ML-7000-551
REV 1

LAST PLOT DATE:
Wed, 05 Nov 2008 - 2:02pm

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS
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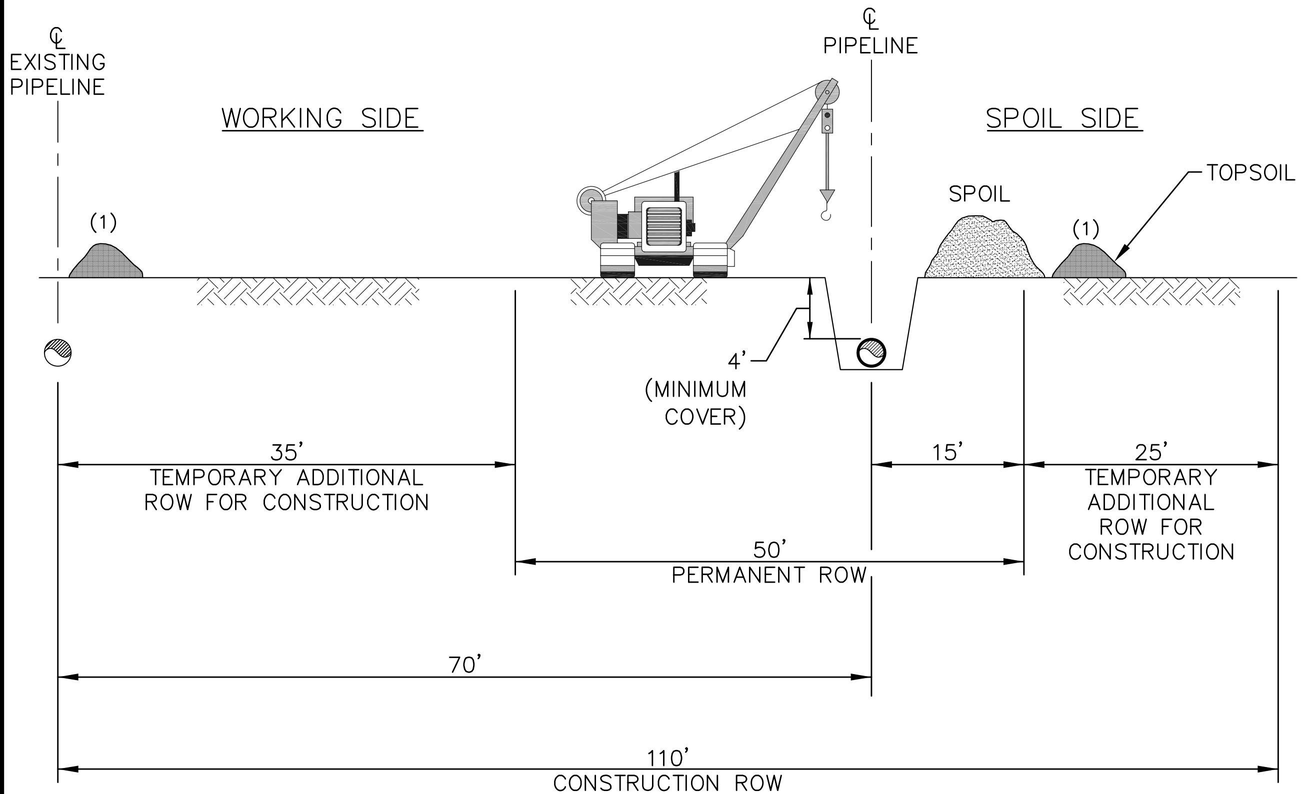

(1) ALTERNATE TOPSOIL PLACEMENT LOCATIONS

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REVISIONS | 1 | 11.05.08 | REMOVED TOPSOIL NEAR TRENCH; MODIFIED TITLE

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9/08/08 — DATE
CHECKED BY:
APPROVED BY:

FIGURE 2.1-10a

FIA #
CHAINAGE:
DISCIPLINE #

TITLE
TYPICAL 110' CONSTRUCTION RIGHT-OF-WAY
(36" PIPELINE ℄ OFFSET) WORKING SIDE ADJACENT AND
CO-LOCATION TO EXISTING PIPELINE

SCALE N.T.S.
DWG No XL-00-ML-7000-551
REV 1

LAST PLOT DATE:
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2.1.5 Pipeline ROW

Thirty-two miles (4 percent) of the Steele City Segment will be located within approximately 300 feet of existing pipeline, utility, or road ROWs. The remainder of the pipeline, 818 miles (96 percent) will be situated in new ROW. No new pipe will be constructed along the Keystone Cushing Extension.

Four hundred seventeen miles (87 percent) of the Gulf Coast Segment will be located within approximately 300 feet of existing pipeline, utility, or road ROWs. The remainder of the pipeline, 61 miles (13 percent) will be situated in new ROW.

Thirty-seven miles (79 percent) of the Houston Lateral will be located within approximately 300 feet of existing pipeline, utility, or road ROWs. The remainder of the pipeline, 10 miles (21 percent) will be situated in the new ROW.

2.1.6 Additional Temporary Workspace Areas

In addition to the construction ROW, Keystone identified typical types of additional temporary workspace areas that will be required (Table 2.1-3). The additional temporary workspace requirements are indicated graphically on the Pipeline route sheets provided in Appendix A. These preliminary areas have been used to quantify impacts of the Project. Additional temporary workspaces will be needed for areas requiring special construction techniques (e.g., river, wetland, and road/rail crossings; horizontal directional drill (HDD) entry and exit points; steep slopes; and rocky soils) and construction staging areas.

The location of additional temporary workspaces will be modified as the Project continues to be refined. This will involve the adjustment of additional temporary workspace as necessary related to actual wetland and waterbody locations, side-hill cuts, and rough terrain. Keystone will adjust additional temporary workspace areas at the prescribed setback distance from wetland and waterbody features unless impractical and as determined on a site-specific basis. As a result, the wetland impact acreage presented is likely overstated.

2.1.7 Pipe Storage and Contractor Yards

Extra workspace areas off of the construction ROW will be required during the construction of the Project to serve as pipe storage yards and contractor yards. Keystone estimates that pipe storage yards, also known as pipe stockpile sites, will be required at 30-mile to 80-mile intervals and contractor yards will be required at approximately 60-mile intervals (Table 2.1-4). Pipe stockpile sites along the pipeline route typically will be located in proximity to railroad sidings. Each stockpile site will occupy approximately 30 acres. Contractor yards will reduce worker transportation requirements during construction and each will occupy approximately 30 acres. To the extent practical, Keystone proposes to use existing commercial/industrial sites or sites that previously were used for construction. Existing public or private roads will be used to access each yard. Both pipe stockpile sites and contractor yards will be used on a temporary basis and will be restored, as appropriate, upon completion of construction.

Pipe stockpile sites and contractor yards will be identified and surveyed prior to construction.

Table 2.1-3 Dimensions and Acreage of Typical Additional Temporary Workspace Areas

Feature	Dimensions (length by width in feet at each side of crossing)	Acreage
Waterbodies traversed via HDD	250 x 150, as well as the length of the drill plus 150 x 150 on exit side	1.4
Waterbodies > 50 feet wide	300 x 100	0.7
Waterbodies < 50 feet wide	150 x 25 on working and spoil sides or 150 x 50 on working side only	0.2
Bored highways and railroads	175 x 25 on working and spoil sides or 175 x 50 on working side only	0.2
Open-cut or bored county or private roads	125 x 25 on working and spoil sides or 125 x 50 on working side only	0.1
Foreign pipeline/utility/other buried feature crossings	125 x 50	0.1
Push-pull wetland crossings	50 feet x length of wetland	Varies
Construction spread mobilization and demobilization	470 x 470	5.1
Stringing truck turnaround areas	200 x 80	0.4

Table 2.1-4 Locations and Acreage of Potential Pipe Storage Yards and Contractor Yards

State / Type of Yard	Counties	Combined Acreage[1]
Montana		
Contractor Yards (3)	Valley, Dawson, Fallon	90
Pipe Stockpile Sites (9)	Phillips, Valley (2), McCone (2), Dawson (2), Fallon (2)	270
South Dakota		
Contractor Yards (4)	Harding, Meade, Jones, Tripp	120
Pipe Stockpile Sites (11)	Harding (3), Meade (2), Haakon (2), Jones (2), Tripp (2)	330
Nebraska		
Contractor Yards (4)	Holt, Nance, York, Jefferson	120
Pipe Stockpile Sites (9)	Keya Paha, Holt, Wheeler, Greeley, Nance, York, Fillmore, Jefferson (2)	270
Kansas		
Contractor Yards	None	0
Pipe Stockpile Sites	None	0
Oklahoma		
Contractor Yards (3)	Lincoln, Pontotoc, Bryan	90
Pipe Stockpile Sites (2)	Lincoln, Pontotoc	60

Table 2.1-4 Locations and Acreage of Potential Pipe Storage Yards and Contractor Yards

State / Type of Yard	Counties	Combined Acreage[1]
Texas		
Contractor Yards (5)	Upshur, Angelina, Jefferson, Liberty, Harris	150
Pipe Stockpile Sites (9)	Fannin, Lamar, Wood, Smith, Rusk, Angelina, Polk, Orange, Harris	270

[1] Acreages of pipe storage yards and contractor yards are based on approximately 30 acres per site.

2.1.8 Access Roads

The Project will use public and existing private roads to provide access to most of the construction ROW. Paved roads are not likely to require improvement or maintenance prior to or during construction. Gravel roads and dirt roads may require maintenance during the construction period due to high use. Road improvements such as blading and filling will be restricted to the existing road footprint. Private roads and any new temporary access roads will be used and maintained only with permission of the landowner or land management agency.

Keystone will construct short, permanent access roads from public roads to the proposed tank farm, pump stations, delivery facilities, and MLVs. The estimated acres of disturbance associated with the new proposed permanent access roads are included in the Aboveground Facility discussion (Section 2.1.10). Prior to construction, Keystone will finalize the location of new permanent access roads along with any temporary access roads. At a minimum, construction of new permanent access roads will require completion of cultural resources and biological surveys, along with the appropriate SHPO and USFWS consultations and approvals. Other state and local permits also may be required prior to construction. In the future, maintenance of newly created access roads will be the responsibility of Keystone.

2.1.9 Aboveground Facilities

The Project will require approximately 206.4 acres of land along the Project segments for aboveground facilities, including pump stations, delivery facilities, densitometer sites, MLVs, and the tank farm.

A total of 30 new pump stations, each situated on 5 acre sites, will be constructed; 18 will be on the Steele City Segment, 10 on the Gulf Coast Segment, and 2 on the Keystone Cushing Extension in Kansas (Table 2.1-1). Each new pump station will consist of up to five pumps driven by electric motors, an electrical building, an electrical substation, two sump tanks, a small maintenance building, and a parking area for station maintenance personnel. Stations will operate on locally purchased electric power and will be fully automated for unmanned operation. The pipe entering and exiting the pump station sites will be located below grade. The pipe manifolding connected with the pump stations will be aboveground. Information related to electrical power lines providing power to the pump stations is contained in Section 7 of this Environmental Report.

Keystone will construct one tank farm on an approximate 50 acre site. The tank farm will consist of three 350,000-barrel tanks to be used operationally for the management of oil movement through the system, as well as four booster pumps, one sump tank, two ultrasonic meters, pig launchers and receivers, two buildings, and parking for maintenance personnel. The tank farm will operate on locally purchased electricity and will be fully automated for unmanned operation.

Keystone will install two delivery facilities along the Project route, one at Nederland and one at Moore Junction, Texas (Table 2.1-1). The delivery facilities will include pressure regulating, sampling, crude oil measurement equipment, a densitometer, a pig receiver and one quality assurance building.

Keystone will construct 73 intermediate MLVs along the new pipeline ROW. MLVs will also be installed at each pump station. When not located at a pump station, MLVs will be sectionalizing block valves constructed within a fenced 50-foot by 50-foot site located on the permanent easement. Remotely operated MLVs are located at pump stations, at major river crossings, and upstream of sensitive waterbodies and at intermediate locations. These remotely operated valves can be activated to shut down the pipeline in the event of an emergency to minimize environmental impacts in the unlikely event of a spill. MLV intervals will be a maximum of approximately 50 miles. The actual spacing intervals between the MLVs will be based upon the location of the pump stations, waterbodies wider than 100 feet, sensitive environmental resources, and other hydraulic profile considerations.

The Project will be designed to permit pigging of the entire length of the pipeline with minimal interruption of service. Pig launchers and/or receivers will be constructed and operated completely within the boundaries of the pump stations or delivery facilities. Launchers and receivers will allow pigging of the pipeline with high-resolution internal line inspection tools and maintenance cleaning pigs.

2.1.10 Construction Procedures

The proposed facilities will be designed, constructed, tested, and operated in accordance with all applicable requirements included in the USDOT regulations at 49 CFR Part 195, *Transportation of Hazardous Liquids by Pipeline*, and other applicable federal and state regulations. These regulations are intended to ensure adequate protection for the public and to prevent crude oil pipeline accidents. Among other design standards, 49 CFR Part 195 specifies pipeline material and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

To manage construction impacts, Keystone will implement its Construction Mitigation and Reclamation Plan (CMRP; Appendix I). This plan contains construction and mitigation procedures that will be used throughout the Project. Subsections address specific environmental conditions.

The Project's Spill Prevention, Control, and Countermeasure (SPCC) Plan will be implemented to avoid or minimize the potential for harmful spills and leaks during construction. The plan describes spill prevention practices, emergency response procedures, emergency and personnel protection equipment, release notification procedures, and cleanup procedures.

Mitigation and other measures contained in this Environmental Report will apply to the basic design and construction specifications applicable to lands disturbed by the Project. This approach will enable construction to proceed with a single set of specifications, irrespective of the ownership status (federal versus non-federal) of the land being crossed. On private lands, these requirements may be modified slightly to accommodate specific landowner requests or preferences or state-specific conditions.

2.1.10.1 General Pipeline Construction Procedures

Before starting construction at a specific site, Keystone will finalize engineering surveys of the ROW centerline and additional temporary extra workspaces and complete the acquisition of ROW easements and any necessary acquisitions of property in fee.

Pipeline construction generally proceeds as a moving assembly line as shown in Figure 2.1-11 and summarized below. Keystone currently plans to construct the pipeline in 13 spreads. Standard pipeline construction is composed of specific activities including survey and staking of the ROW, clearing and grading, pipe stringing, bending, trenching, welding, lowering in, backfilling, hydrostatic testing, and cleanup. In addition to standard pipeline construction methods, Keystone will use special construction techniques where warranted by site-specific conditions. These special techniques will be used when constructing across rugged terrain, waterbodies, wetlands, paved roads, highways, and railroads (Section 2.1.10.2).

Survey and Staking

Before construction begins at any given location, the limits of the approved work area (i.e., the construction ROW boundaries and any additional temporary workspace areas) will be marked and the location of approved access roads and existing utility lines will be flagged. Landowner fences will be braced and cut and temporary gates and fences will be installed to contain livestock, if present. Wetland boundaries and other environmentally sensitive areas also will be marked or fenced for protection at this time. Before the pipeline trench is excavated, a survey crew will stake the centerline of the proposed trench and any buried utilities along the ROW.

Clearing and Grading

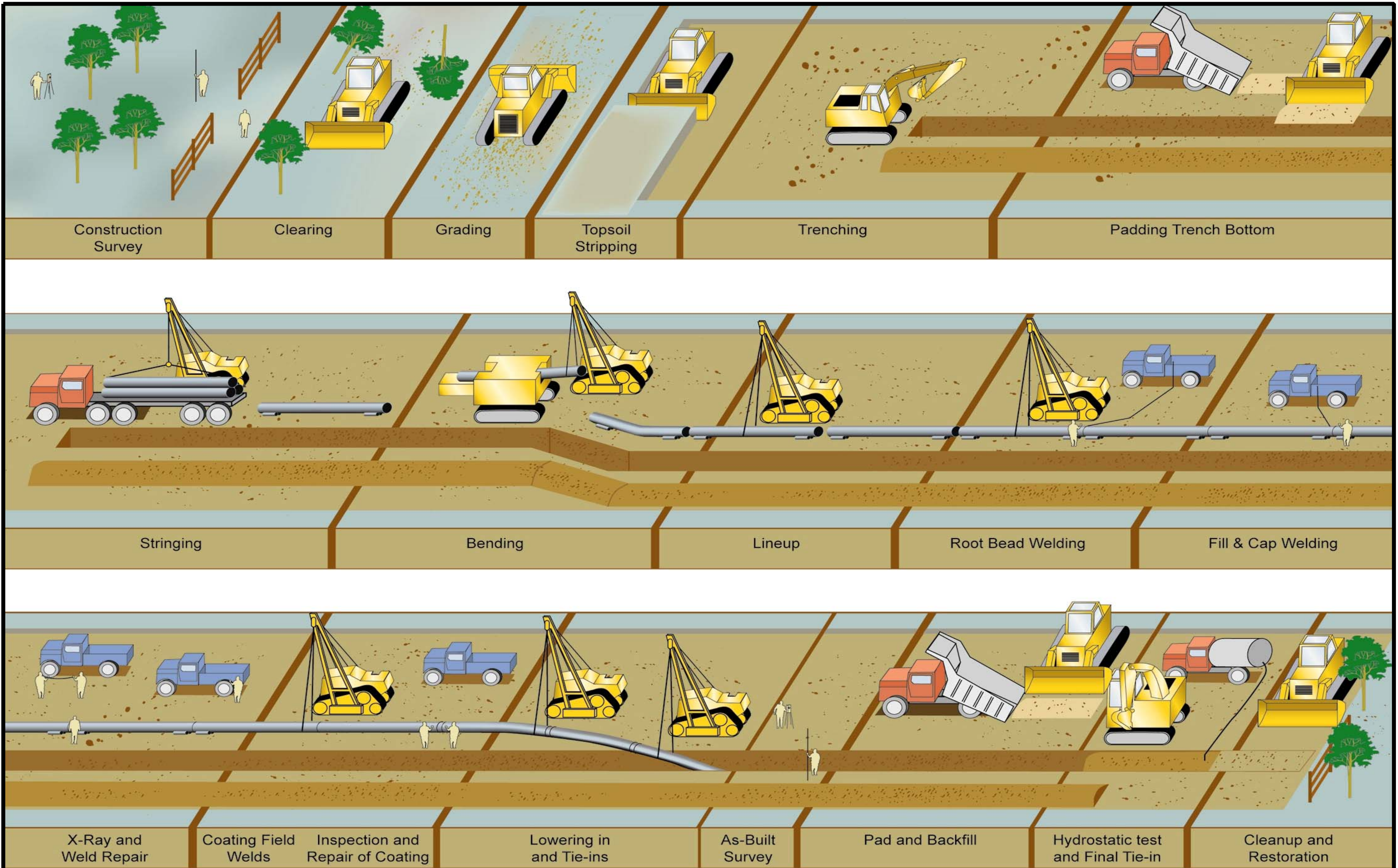
A clearing crew will follow the fencing crew and will clear the work area of vegetation (including crops) and obstacles (e.g., trees, logs, brush, rocks). Temporary erosion control measures such as silt fence or straw bales will be installed prior to vegetation removal along slopes leading to wetlands and riparian areas. Grading will be conducted where necessary to provide a reasonably level work surface. Where the ground is relatively flat and does not require grading, rootstock will be left in the ground. More extensive grading will be required in steep side slopes or vertical areas and where necessary to prevent excessive bending of the pipe.

Trenching

The trench will be excavated to a depth that provides sufficient cover over the pipeline after backfilling. Typically, the trench will be seven to eight feet deep and four to five feet wide in stable soils. In most areas, the USDOT requires a minimum of 30 inches of cover and as little as 18 inches in rocky areas. To reduce the risk of third party damage Keystone will exceed the federal depth of cover requirements in most areas. In all areas, except areas of consolidated rock, the depth of cover for the Keystone pipeline will be a minimum of 48 inches (Table 2.1-5). In consolidated rock the minimum depth of cover will be 36 inches. Trenching may precede bending and welding or may follow based on several factors including soil characteristics, water table, presence of drain tiles, and weather conditions at the time of construction.

Table 2.1-5 Minimum Pipeline Cover

Location	Normal Excavation (inches)	Rock Excavation (inches)
Most areas	48	36
All waterbodies	60	36
Dry creeks, ditches, drains, washes, gullies, etc.	60	36
Drainage ditches at public roads and railroads	60	48



Typical Pipeline Construction Sequence
Figure 2.1-11

When rock or rocky formations are encountered, tractor-mounted mechanical rippers or rock trenchers will be used to fracture the rock prior to excavation. In areas where mechanical equipment can not break up or loosen the bedrock, blasting (use of explosives) will be required (Section 2.1.10.2). After the pipeline is padded, excavated rock will be used to backfill the trench to the top of the existing bedrock profile.

Topsoil segregation will be based on site specific circumstances and shall implement one of the following mitigating measures. Topsoil will be separated from subsoil over the trench, over the trench and spoil side, or full width of ROW. When soil is removed from only the trench, topsoil will be piled on the near side of the trench and subsoil on the far side of the trench. This will allow for proper restoration of the soil during the backfilling process (see Figures 2.1-8 through 2.1-10a). When soil is removed from both the trench and the spoil side, topsoil will be stored on the edge of the near side of the construction ROW and the subsoil on the spoil side of the trench. In areas where the ROW will be graded to provide a level working surface and where there is another need to separate topsoil from subsoil, topsoil will be removed from the entire area to be graded and stored separately from the subsoil.

Topsoil will be piled such that the mixing of subsoil and topsoil will not occur. Gaps will be left between the spoil piles to prevent storm water runoff from backing up or flooding.

Pipe Stringing, Bending, and Welding

Prior to or following trenching, sections of externally coated pipe approximately 80 feet long (also referred to as "joints") will be transported by truck over public roads and along authorized private access roads to the ROW and placed or "strung" along the ROW.

After the pipe sections are strung along the trench and before joints are welded together, individual sections of the pipe will be bent to conform to the contours of the trench by a track-mounted, hydraulic pipe-bending machine. For larger bend angles, fabricated bends may be used.

After the pipe sections are bent, the joints will be welded together into long strings and placed on temporary supports. During welding the pipeline joints will be lined up and held in position until securely joined. Keystone will non-destructively inspect 100 percent of the welds using radiographic, ultrasonic, or other USDOT approved method. Welds that do not meet established specifications will be repaired or removed. Once the welds are approved, a protective epoxy coating will be applied to the welded joints. The pipeline will then be electronically inspected or "jeeped" for faults or holidays in the epoxy coating and visually inspected for any faults, scratches, or other coating defects. Damage to the coating will be repaired before the pipeline is lowered into the trench.

In rangeland areas used for grazing, construction activities potentially can hinder the movement of livestock if the livestock cannot be relocated temporarily by the owner. Construction activities may also hinder the movement of wildlife. To minimize the impact on livestock and wildlife movements during construction, Keystone will leave hard plugs (short lengths of unexcavated trench) or install soft plugs (areas where the trench is excavated and replaced with minimal compaction) to allow livestock and wildlife to cross the trench safely. Soft plugs will be constructed with a ramp on each side to provide an avenue of escape for animals that may fall into the trench.

Lowering in and Backfilling

Before the pipeline is lowered into the trench, the trench will be inspected to be sure it is free of livestock or wildlife, as well as rock and other debris that could damage the pipe or its protective coating. In areas where water has accumulated, dewatering may be necessary to permit inspection of the bottom of the trench. The pipeline then will be lowered into the trench. On sloped terrain, trench breakers (e.g., stacked sand bags or foam) will be installed in the trench at specified intervals to prevent subsurface water movement along the pipeline. The trench will then be backfilled using the excavated material. In rocky areas, the pipeline will be

protected with an abrasion-resistant coating or rock shield (fabric or screen that is wrapped around the pipe to protect the pipe and its coating from damage by rocks, stones, and roots). Alternatively, the trench bottom will be filled with padding material (e.g., sand, soil, or gravel) to protect the pipeline. No topsoil will be used as padding material. Topsoil will be returned to its original horizon after subsoil is backfilled in the trench.

Hydrostatic Testing

The pipeline will be hydrostatically tested in sections of approximately 30 miles (with a maximum 50 miles) to ensure the system is capable of withstanding the operating pressure for which it is designed. This process involves isolating the pipe segment with test manifolds, filling the segment with water, pressurizing the segment to a pressure a minimum of 1.25 times the maximum operating pressure (MOP) at the high point elevation of each test section, and maintaining that pressure for a period of eight hours. Fabricated assemblies may be tested prior to installation in the trench for a period of four hours. The hydrostatic test will be conducted in accordance with 49 CFR Part 195.

Keystone proposes to obtain water for hydrostatic testing from rivers and streams crossed by the pipeline and in accordance with federal, state, and local regulations. Generally the pipeline will be hydrostatically tested after backfilling and all construction work that will directly affect the pipe is complete. If leaks are found, they will be repaired and the section of pipe retested until specifications are met. Water used for the testing will then be transferred to another pipe segment for subsequent hydrostatic testing. Alternately, the water will be tested to ensure compliance with the NPDES discharge permit requirements, treated if necessary, and discharged. Hydrostatic testing is discussed further in the Section 4.2.4.1 of this Environmental Report and in the CMRP.

Pipe Geometry Inspection

The pipeline will be inspected prior to final tie-ins utilizing an electronic caliper (geometry) pig to ensure the pipeline does not have any dents or ovality that might be detrimental to the operation of the pipeline.

Final Tie-ins

Following successful hydrostatic testing, test manifolds will be removed and the final pipeline tie-in welds will be made and inspected.

Commissioning

After the final tie-ins are complete and inspected, the pipeline will be cleaned and dewatered. Commissioning involves verifying that equipment has been installed properly and is working, that controls and communications systems are functional, and that the pipeline is ready for service. In the final step, the pipeline is prepared for service by filling the line with crude oil.

Cleanup and Restoration

During cleanup, construction debris on the ROW will be disposed of and work areas will be final graded. Preconstruction contours will be restored as closely as possible. Segregated topsoil will be spread over the surface of the ROW and permanent erosion controls will be installed. After backfilling, final cleanup will begin as soon as weather and site conditions permit. Every reasonable effort will be made to complete final cleanup (including final grading and installation of erosion control devices) within approximately 20 days after backfilling the trench (approximately 10 days in residential areas), subject to weather and seasonal constraints. Construction debris will be cleaned up and taken to an appropriate disposal facility.

After permanent erosion control devices are installed and final grading complete, all disturbed work areas except annually cultivated fields will be seeded as soon as possible. Seeding is intended to stabilize the soil,

revegetate areas disturbed by construction, and restore native vegetation. Timing of the reseeding efforts will depend upon weather and soil conditions and will be subject to the prescribed rates and seed mixes specified by the landowner, land management agency, or Natural Resource Conservation Service (NRCS) recommendations. On agricultural lands, seeding will be conducted only as agreed upon with the landowner.

Keystone will restrict access to the permanent easement using gates, boulders, or other barriers to minimize unauthorized access by all-terrain vehicles in wooded areas if requested by the landowner. Pipeline markers will be installed at road and railroad crossings and other locations (as required by 49 CFR Part 195) to show the location of the pipeline. Markers will identify the owner of the pipeline and convey emergency contact information. Special markers providing information and guidance to aerial patrol pilots also will be installed.

2.1.10.2 Special Construction Procedures

In addition to standard pipeline construction methods, Keystone will use special construction techniques where warranted by site-specific conditions. These special techniques will be used when crossing roads, highways and railroads; steep terrain; unstable soils; waterbodies; wetlands; areas that require blasting; and residential and commercial areas. These special techniques are described below.

<u>Road, Highway, and Railroad Crossings</u>

Construction across paved roads, highways, and railroads will be in accordance with the requirements of the road and railroad crossing permits and approvals obtained by Keystone. In general, all major paved roads, all primary gravel roads, highways, and railroads will be crossed by boring beneath the road or railroad. Figure 2.1-12 illustrates a typical bored road or railroad crossing. Boring requires the excavation of a pit on each side of the feature, the placement of boring equipment in the pit, and boring a hole under the road at least equal to the diameter of the pipe. Once the hole is bored, a prefabricated pipe section will be pulled through the borehole. For long crossings, sections can be welded onto the pipe string just before being pulled through the borehole. Boring will result in minimal or no disruption to traffic at road or railroad crossings. Each boring will be expected to take 1 to 2 days for most roads and railroads and 10 days for long crossings such as interstate or four-lane highways.

Most smaller, unpaved roads and driveways will be crossed using the open-cut method where permitted by local authorities or private owners. The open-cut method will require temporary closure of the road to traffic and establishment of detours. If no reasonable detour is feasible, at least one lane of traffic will be kept open, except during brief periods when it is essential to close the road to install the pipeline. Most open-cut road crossings can be finished and the road resurfaced in 1 or 2 days. Keystone will take measures, such as posting signs at open-cut road crossings to ensure safety and minimize traffic disruptions and prepare traffic control plans in accordance with the applicable regulations as necessary.

<u>Steep Terrain</u>

Additional grading may be required in areas where the proposed pipeline route will cross steep slopes. Steep slopes often need to be graded down to a gentler slope for safe operation of construction equipment and to accommodate pipe-bending limitations. In such areas, the slopes will be excavated prior to pipeline installation and reconstructed to a stable condition.

In areas where the pipeline route crosses laterally along the side of a slope, cut and fill grading may be required to obtain a safe, flat work terrace. Topsoil will be stripped from the entire ROW and stockpiled prior to cut and fill grading on steep terrain. Generally on steep slopes, soil from the high side of the ROW will be excavated and moved to the low side of the ROW to create a safe and level work terrace. After the pipeline is installed, the soil from the low side of the ROW will be returned to the high side and the slope's contour will be restored as near as practicable to pre-construction condition. Topsoil from the stockpile will be spread over the surface, erosion control features installed, and seeding implemented.

In steep terrain, temporary sediment barriers such as silt fence and straw bales will be installed during clearing to prevent the movement of disturbed soil into wetland, waterbody, or other environmentally sensitive areas. Temporary slope breakers consisting of mounded and compacted soil will be installed across the ROW during grading and permanent slope breakers will be installed during cleanup. Following construction, seed will be applied to steep slopes and the ROW will be mulched with hay or non-brittle straw or covered with erosion control fabric. Sediment barriers will be maintained across the ROW until permanent vegetation is established. Additional temporary workspace may be required for storage of graded material and/or topsoil during construction.

Unstable Soils

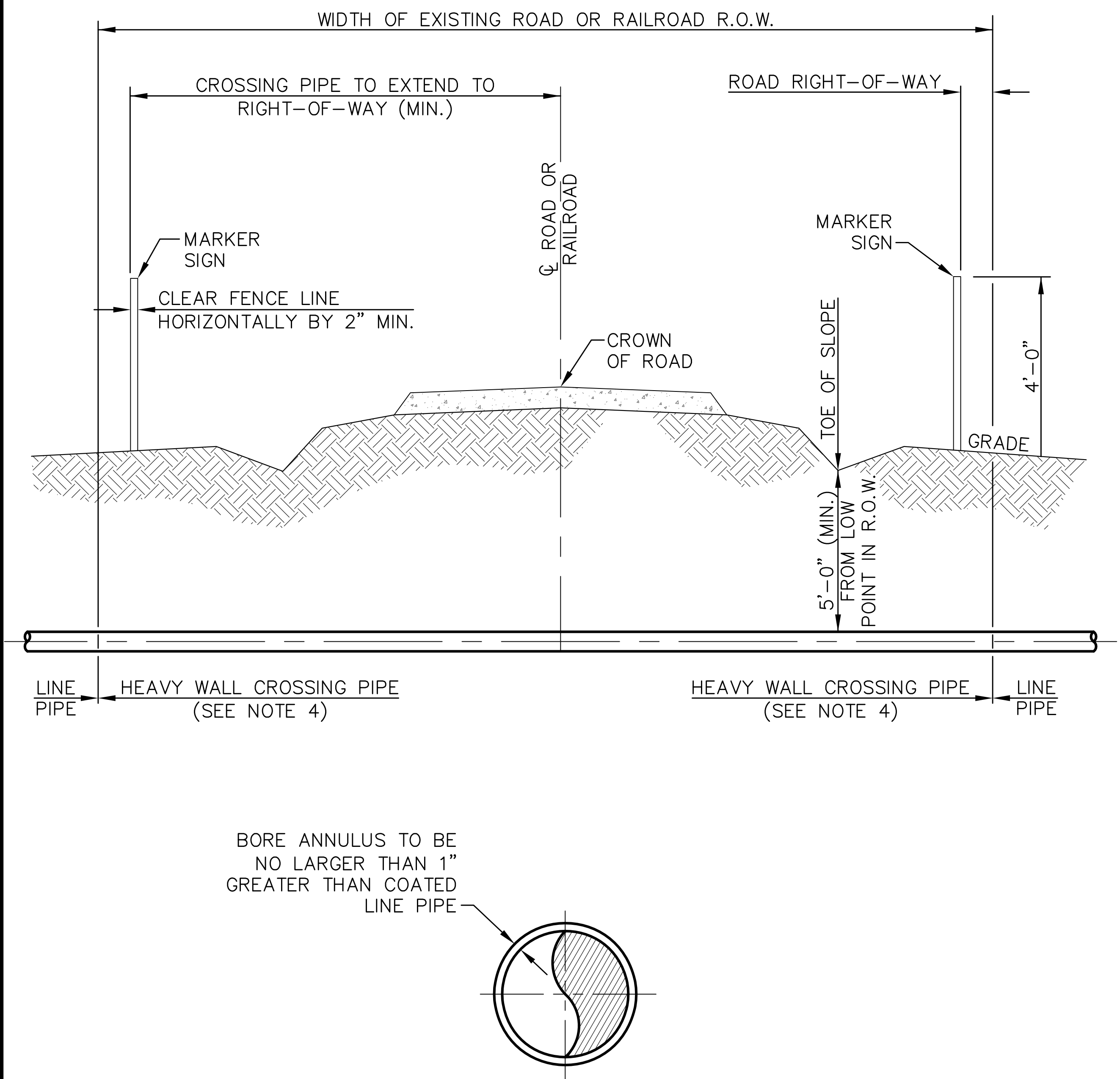
Construction in unstable soils, such as those within the sandhills region of South Dakota and Nebraska, will be in accordance with measures outlined in the CMRP. Keystone will apply special construction and mitigation techniques to areas with high potential for landslides, erosion-prone locations, and blowouts. To facilitate reclamation, Keystone could implement measures such as the use of photodegradable mats and livestock controls.

Waterbody Crossings - Perennial

A total of 205 perennial waterbodies will be crossed during the construction of the Project. Perennial waterbodies will be crossed using one of four techniques: the open-cut wet method (Keystone's preferred method), dry flume method, dry dam-and-pump method, or HDD. Each method is described below.

Keystone's preferred crossing method will be to use the open-cut crossing method. The open-cut method involves trenching through the waterbody while water continues to flow through the construction work area (CMRP Details 11 and 12). Pipe segments for the crossing will be fabricated adjacent to the waterbody. Generally, backhoes operating from one or both banks will excavate the trench within the streambed. In wider rivers, in-stream operation of equipment may be necessary. Hard or soft trench plugs will be placed to prevent the flow of water into the upland portions of the trench. Trench spoil excavated from the streambed generally will be placed at least 10 feet away from the water's edge unless stream width is great enough to require placement in the stream bed. Sediment barriers will be installed where necessary to control sediment and to prevent excavated spoil from entering the water. After the trench is dug, the prefabricated pipeline segment will be carried, pushed, or pulled across the waterbody and positioned in the trench. When crossing saturated wetlands with flowing waterbodies using the open-cut method, the pipe coating will be covered with reinforced concrete or concrete weights to provide negative buoyancy. The trench will then be backfilled with native material or with imported material if required by applicable permits. Following backfilling, the banks will be restored and stabilized.

The Project will utilize dry flume or dry dam-and-pump methods (CMRP Details 13 and 14) where technically feasible on environmentally sensitive waterbodies as warranted by resource-specific sensitivities. The flume crossing method involves diverting the flow of water across the trenching area through one or more flume pipes placed in the waterbody. The dam-and-pump method is similar to the flume method except that pumps and hoses will be used instead of flumes to move water around the construction work area. In both methods, trenching, pipe installation, and backfilling are done while water flow is maintained for all but a short reach of the waterbody at the actual crossing. Once backfilling is completed, the stream banks restored and stabilized and the flume or pump hoses are removed.



NOTES:

1. CROSSINGS SHALL BE IN ACCORDANCE WITH APPLICABLE PERMIT.
2. ROAD CROSSING PIPE SHALL EXTEND AT MINIMUM TO RIGHT–OF–WAY LINE UNLESS OTHERWISE SPECIFIED.
3. THE TYPE AND MINIMUM REQUIRED LENGTH OF PIPE FOR CROSSINGS OF ROADS SHALL BE AS SPECIFIED ON ALIGNMENT SHEETS.
4. PIPE FOR BORED CROSSINGS TO INCLUDE ABRASION–RESISTANT (ARB) COATING.
5. PIPELINE MARKER AND TEST STATIONS TO BE INSTALLED ON RIGHT–OF–WAY LINE NEXT TO FENCE IF POSSIBLE.
6. THE CROSSING PIPE SHALL BE STRAIGHT WITH NO VERTICAL OR HORIZONTAL BENDS WITHIN ROAD RIGHT–OF–WAY.

REVISIONS	
1	Updated drawing notes

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KEYSTONE XL PROJECT

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ORIGINATOR: JOE A. NELSON (NAME) 11/04/08 (DATE)

CHECKED BY:

APPROVED BY:

FIGURE 2.1–12

FIA #

CHAINAGE:

DISCIPLINE #

TITLE

TYPICAL UNCASED ROAD/RAILROAD CROSSING BORE DETAIL

SCALE N.T.S.

DWG No XL–00–ML–7000–522

REV 1

LAST PLOT DATE: Tue, 04 Nov 2008 – 3:42pm

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Keystone plans to use the HDD method of construction for 33 waterbody crossings (Table 2.1-6) on the Project. The HDD method involves drilling a pilot hole under the waterbody and banks, then enlarging the hole through successive reamings until the hole is large enough to accommodate a prefabricated segment of pipe. Throughout the process of drilling and enlarging the hole, slurry consisting mainly of water and bentonite clay will be circulated to power and lubricate the drilling tools, remove drill cuttings, and provide stability to the drilled holes. Pipe sections long enough to span the entire crossing will be staged and welded along the construction work area on the opposite side of the waterbody and then pulled through the drilled hole. Ideally, use of the HDD method results in no impact on the banks, bed, or water quality of the waterbody being crossed (CMRP Detail 15).

Approximately 472 intermittent waterbody crossings are required by the Project. In the event these intermittent waterbodies are dry at the time of crossing, Keystone proposes to use conventional upland cross-country construction techniques. If an intermittent waterbody is flowing when crossed, Keystone will install the pipeline using the open-cut wet crossing method discussed previously. When crossing waterbodies, Keystone will adhere to the guidelines outlined in its Site-Specific Waterbody Crossing Plans (Appendix D), and/or Keystone's CMRP located in Appendix I and the requirements of its waterbody crossing permits.

Additional temporary workspace areas will be required on both sides of all waterbodies to stage construction, fabricate the pipeline, and store materials. These workspaces will be located at least 10 feet away from the water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Before construction, temporary bridges (e.g., subsoil fill over culverts, timber mats supported by flumes, railcar flatbeds, flexi-float apparatus) will be installed across all perennial waterbodies to allow construction equipment to cross. Construction equipment will be required to use the bridges, except the clearing crew, which will be allowed one pass through the waterbodies before the bridges are installed.

During clearing, sediment barriers such as silt fence and staked straw bales will be installed and maintained on drainages across the ROW adjacent to waterbodies and within additional temporary workspace areas to minimize the potential for sediment runoff. Silt fence and straw bales located across the working side of the ROW will be removed during the day when vehicle traffic is present and will be replaced each night. Alternatively, drivable berms could be installed and maintained across the ROW in lieu of a silt fence or straw bales.

In general, equipment refueling and lubricating at waterbodies will take place in upland areas that are 100 feet or more from the water. When circumstances dictate that equipment refueling and lubricating will be necessary in or near waterbodies, Keystone will follow its SPCC Plan to address the handling of fuel and other hazardous materials.

After the pipeline is installed beneath the waterbody, restoration will begin. Waterbody banks will be restored to preconstruction contours or to a stable configuration. Appropriate erosion control measures such as rock riprap, gabion baskets (rock enclosed in wire bins), log walls, vegetated geogrids, or willow cuttings will be installed as necessary on steep banks in accordance with permit requirements. More stable banks will be seeded with native grasses and mulched or covered with erosion control fabric. Waterbody banks will be temporarily stabilized within 24 hours of completing in-stream construction. Sediment barriers, such as silt fences, straw bales or drivable berms will be maintained across the ROW at all waterbody approaches until permanent vegetation is established. Temporary equipment bridges will be removed following construction.

Table 2.1-6 Waterbodies Crossed using the HDD Method

Waterbody	# Crossings	Approximate Milepost(s)
Steele City Segment		
Milk River	1	82.7
Missouri River	1	88.8
Yellowstone River	1	196.0
Little Missouri River	1	291.7
Cheyenne River	1	426.5
White River	1	535.4
Keya Paha River	1	598.3
Niobrara River	1	613.7
Loup River	1	738.5
Platte River	1	755.3
Gulf Coast Segment		
Deep Fork	1	22.7
North Canadian River	1	39.1
Canadian River	1	74.6
Little River	1	70.6
Muddy Boggy Creek	1	87.1
Clear Boggy Creek	1	126.2
Red River	1	154.7
Bois D'Arc Creek	1	161.1
North Sulphur River	1	189.6
South Sulphur River	1	200.7
Sabine River	1	262.2
East Fork of Angelina River	1	311.5
Angelina River	1	332.3
Menard Creek	1	412.4
Neches	1	366.0
Neches Valley Canal Authority	2	457.7
Hillebrandt Bayou	1	469.5
Houston Lateral		
Trinity Creek Marsh	1	17.3
Trinity River	1	22.0
Cedar Bayou	1	35.0
McCracken Lake	1	42.1
San Jacinto	1	43.3

Wetland Crossings

Data from wetland delineation field surveys, aerial photography, and National Wetland Inventory (NWI) mapping were used to identify wetlands crossed by the proposed pipeline. Pipeline construction across wetlands will be similar to typical conventional upland cross-country construction procedures, with several modifications where necessary to reduce the potential for pipeline construction to affect wetland hydrology and soil structure.

The wetland crossing method used will depend largely on the stability of the soils at the time of construction. If wetland soils are not excessively saturated at the time of construction and can support construction equipment without equipment mats, construction will occur in a manner similar to conventional upland cross-country construction techniques (CMRP Detail 8). Topsoil will be segregated over the trench line. In most saturated soils, topsoil segregation will not be possible. Additional temporary workspace areas will be required on both sides of particularly wide saturated wetlands to stage construction, fabricate the pipeline, and store materials. These additional temporary workspace areas will be located in upland areas a minimum of 10 feet from the wetland edge. More information is located in the Site-Specific Waterbody Crossing Plans located in Appendix D.

Construction equipment working in saturated wetlands will be limited to that area essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where there is no reasonable access to the ROW except through wetlands, non-essential equipment will be allowed to travel through wetlands only if the ground is firm enough or has been stabilized to avoid rutting.

Clearing of vegetation in wetlands will be limited to trees and shrubs, which will be cut flush with the surface of the ground and removed from the wetland. To avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland soils, stump removal, grading, topsoil segregation, and excavation will be limited to the area immediately over the trench line. During clearing, sediment barriers, such as silt fence and staked straw bales, will be installed and maintained on down slopes adjacent to saturated wetlands and within additional temporary workspace areas as necessary to minimize the potential for sediment runoff.

Where wetland soils are saturated or inundated, the pipeline can be installed using the push-pull technique. The push-pull technique involves stringing and welding the pipeline outside of the wetland and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. The prefabricated pipeline is installed in the wetland by equipping it with floats and pushing or pulling it across the water-filled trench. After the pipeline is floated into place, the floats are removed and the pipeline sinks into place. Most pipe installed in saturated wetlands will be coated with concrete or equipped with set-on weights to provide negative buoyancy. Because little or no grading will occur in wetlands, restoration of contours will be accomplished during backfilling. Prior to backfilling, trench breakers will be installed where necessary to prevent the subsurface drainage of water from wetlands. Where topsoil has been segregated from subsoil, the subsoil will be backfilled first followed by the topsoil. Topsoil will be replaced to the original ground level leaving no crown over the trench line. In some areas where wetlands overlie rocky soil, the pipe will be padded with rock-free soil or sand before backfilling with native bedrock and soil. Equipment mats, timber riprap, gravel fill, geotextile fabric, and straw mats will be removed from wetlands following backfilling except in the travel lane to allow continued, but controlled, access through the wetland until the completion of construction. Upon the completion of construction, these materials will be removed.

Where wetlands are located at the base of slopes, permanent slope breakers will be constructed across the ROW in upland areas adjacent to the wetland boundary. Temporary sediment barriers will be installed where necessary until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers will be removed from the ROW and disposed of properly.

In wetlands where no standing water is present, the construction ROW will be seeded in accordance with the recommendations of the local soil conservation authorities or land management agency.

Blasting

Blasting may be required in areas where consolidated shallow bedrock or boulders cannot be removed by conventional excavation methods. If blasting is required to clear the ROW and to fracture rock within the ditch, strict safety precautions will be followed. Keystone will exercise extreme care to avoid damage to underground structures, cables, conduits, pipelines, and underground watercourses or springs. To protect property and livestock, Keystone will provide adequate notice to adjacent landowners or tenants in advance of blasting. Blasting activity will be performed during daylight hours and in compliance with federal, state, and local codes and ordinances and manufacturers' prescribed safety procedures and industry practices.

Residential and Commercial Construction

Keystone used aerial photography dated February 2008 and field survey data to identify areas containing buildings within 25 feet of the construction ROW. These areas are summarized in Table 2.1-7. Prior to construction, Keystone will verify the proximity of buildings to the pipeline and determine if the structures are occupied residences or businesses. Keystone will develop site-specific construction plans to mitigate the impacts of construction on residential and commercial structures.

Table 2.1-7 Buildings Located Within 25 feet of the Construction Workspace

State	County	MP
Steele City Segment		
Montana	None	None
South Dakota	None	None
Nebraska	None	None
Gulf Coast Segment		
Oklahoma	Lincoln	2.7
	Lincoln	14.0
	Lincoln	17.3
	Lincoln	17.3
	Lincoln	18.5
	Okfuskee	33.5
	Okfuskee	33.5
	Seminole	47.7
	Hughes	62.7
	Hughes	63.7
	Hughes	68.9
	Hughes	69.8
	Coal	100.0
	Atoka	124.3
	Atoka	125.4
	Atoka	125.4
	Bryan	140.6
	Bryan	145.5

Table 2.1-7 Buildings Located Within 25 feet of the Construction Workspace

State	County	MP
	Bryan	145.5
	Bryan	145.6
Texas	Lamar	166.2
	Lamar	166.2
	Lamar	170.6
	Lamar	176.2
	Lamar	176.2
	Lamar	176.2
	Delta	194.5
	Delta	194.5
	Delta	197.8
	Delta	198.2
	Hopkins	204.1
	Hopkins	208.2
	Hopkins	208.4
	Hopkins	208.4
	Hopkins	217.7
	Hopkins	219.1
	Franklin	226.2
	Franklin	226.3
	Franklin	229.1
	Franklin	229.1
	Franklin	230.1
	Franklin	230.1
	Franklin	231.1
	Franklin	231.1
	Franklin	231.1
	Wood	232.1
	Wood	233.5
	Wood	233.5
	Wood	233.9
	Wood	234.0
	Wood	236.6
	Wood	237.9
	Wood	242.8
	Wood	242.9
	Upshur	258.4
	Upshur	259.3

Table 2.1-7 Buildings Located Within 25 feet of the Construction Workspace

State	County	MP
Texas, Continued	Smith	265.2
	Smith	265.2
	Smith	265.3
	Smith	269.4
	Smith	269.9
	Smith	270.2
	Smith	276.1
	Smith	276.3
	Smith	277.5
	Smith	277.8
	Smith	277.9
	Smith	277.9
	Smith	281.6
	Smith	284.1
	Smith	284.1
	Smith	284.5
	Smith	285.9
	Smith	286.9
	Smith	286.9
	Smith	286.9
	Smith	289.2
	Rusk	307.8
	Rusk	308.4
	Nacogdoches	314.6
	Nacogdoches	325.4
	Nacogdoches	325.4
	Nacogdoches	329.9
	Nacogdoches	330.1
	Angelina	345.0
	Polk	370.7
	Polk	370.7
	Polk	370.7
	Polk	370.7
	Polk	370.7
	Polk	370.8
	Polk	387.3
	Polk	388.5
	Polk	388.5

Table 2.1-7 Buildings Located Within 25 feet of the Construction Workspace

State	County	MP
Texas, Continued	Polk	388.6
	Polk	393.7
	Polk	396.5
	Polk	397.8
	Jefferson	457.2
	Jefferson	460.9
	Jefferson	460.9
	Jefferson	476.8
Houston Lateral		
Texas	Liberty	9.2
	Liberty	18.1
Texas, continued	Liberty	18.2
	Liberty	38.8
	Liberty	45.7

Fences and Grazing

Fences will be crossed or paralleled by the construction ROW. Before cutting any fence for pipeline construction, each fence will be braced and secured to prevent the slacking of the fence. To prevent the passage of livestock the opening in the fence will be closed temporarily when construction crews leave the area. If gaps in natural barriers used for livestock control are created by pipeline construction, the gaps will be fenced according to the landowner's requirements. All existing improvements, such as fences, gates, irrigation ditches, cattle guards, and reservoirs will be maintained during construction and repaired to pre-construction conditions or better upon completion of construction activities.

2.1.10.3 Aboveground Facility Construction Procedures

Construction activities at each of the new pump stations will follow a standard sequence of activities: clearing and grading, installing foundations for the electrical building and support buildings, and erecting the structures to support the pumps and/or associated facilities. A block valve is installed in the mainline with two side block valves; one to the suction piping of the pumps and one from the discharge piping of the pumps. Construction activities and the storage of building materials will be confined to the pump station construction sites. Figures 2.1-13 and 2.1-14 illustrate typical plot plans for a pump stations.

The sites for the pump stations will be cleared of vegetation and graded as necessary to create a level surface for the movement of construction vehicles and to prepare the area for the building foundations. Foundations will be constructed for the pumps and buildings and soil will be stripped from the construction footprint.

Each pump station will include one electrical building and one support building. The electrical building will include electrical systems, communication, and control equipment. The second building houses a small office. The crude oil piping, both aboveground and below ground, will be installed and pressure tested using methods similar to those used for the main pipeline. After testing is successfully completed, the piping will be tied into the main pipeline. Piping installed below grade will be coated for corrosion protection prior to backfilling. In addition, all below grade facilities will be protected by a cathodic protection system. Before being put into

service, pumps, controls, and safety devices will be checked and tested to ensure proper system operation and activation of safety mechanisms.

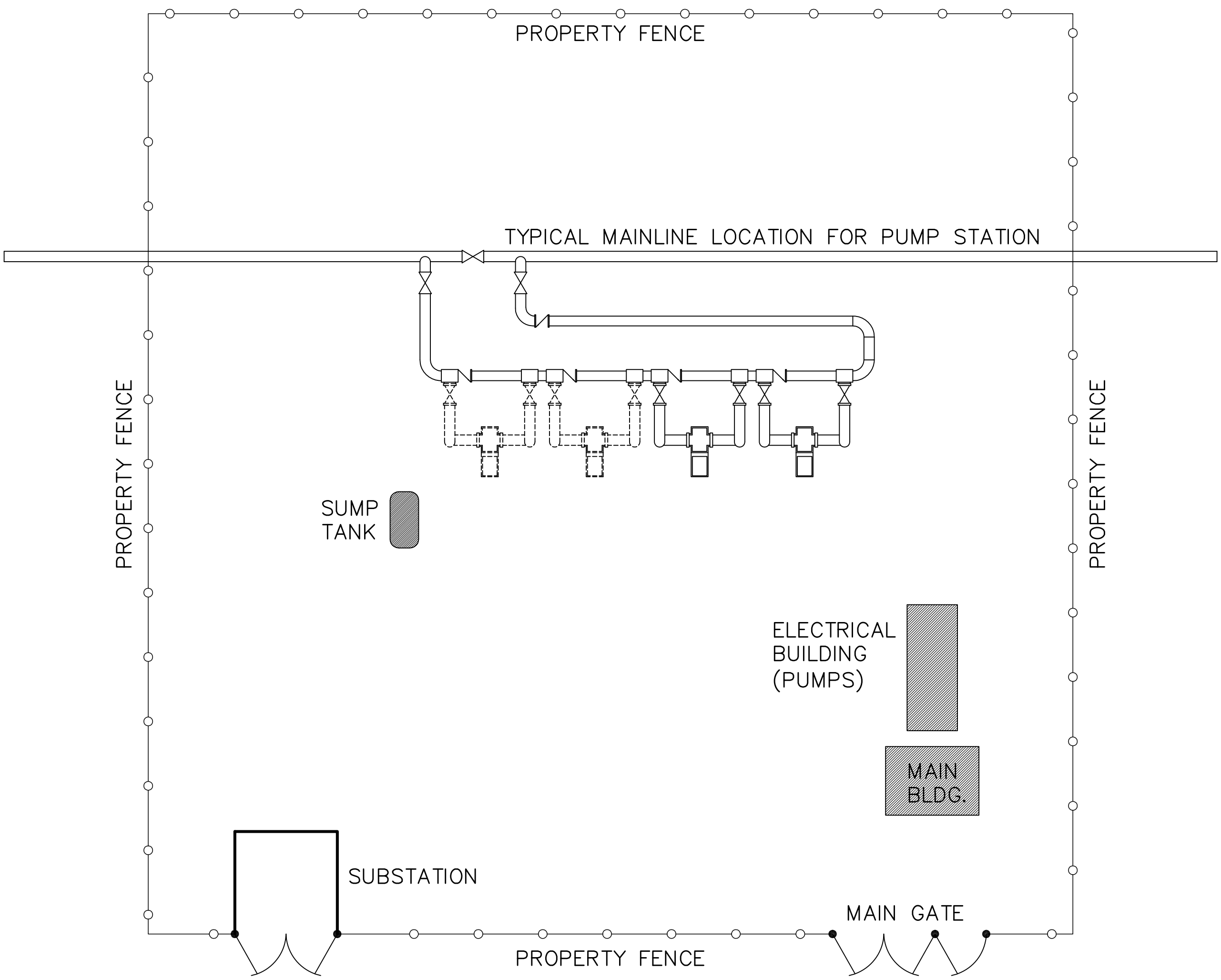
The site for the tank farm will be co-located with Pump Station 26 at Steele City, Nebraska. The tank farm site will be cleared and graded to create a level work surface for the tanks. Topsoil from the site will be stored adjacent to the site area. The welded steel tank structures with internal floating roofs will be installed inside an impervious bermed area which will act as secondary containment. The piping in the tank farm area will be both above and below ground. The tanks and associated piping will be isolated electrically from the pipeline and protected by their own cathodic protection system. The electrical and control system for the tanks and associated piping will share the facilities required for the adjacent pump station. After successful hydrostatic testing of the tanks and associated piping and commissioning of the control system, the tanks will be connected with the pipeline system. Each tank will have a separate water screen and fire suppression system supplied by a fire water supply pond located on the site. In addition to this pond, a separate larger pond will be installed to manage storm water and mitigate any potential contamination from the site (Figure 2.1-15).

Each pump station and the tank farm will require electricity and communication facilities, which will be obtained from local utilities. Table 2.1-8 summarizes new electrical power and distribution line requirements.

After the completion of startup and testing, the pump station sites and the tank farm will be final graded. A permanent security fence will be installed around each pump station site and the tank farm.

Where delivery and pigging facilities are co-located with a pump station or the tank farm, the delivery and pigging facilities will be located entirely within the facility. Construction activities will include clearing, grading, trenching, installing piping, erecting buildings, fencing the facilities, cleaning up, and restoring the area. The delivery facilities will operate on locally provided power (Table 2.1-8).

MLV construction will be carried out concurrently with the construction of the pipeline. Wherever practical, MLVs will be located near public roads to allow year-round access. If necessary, permanent access roads or approaches will be constructed to each fenced MLV site.



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REVISIONS	
1	REMOVED SEPTIC TANK; RENUMBERED FIG.

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KEYSTONE XL PROJECT
PREPARED BY:
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ORIGINATOR: JOE A. NELSON (NAME) 9/08/08 (DATE)

CHECKED BY:

APPROVED BY:

FIGURE 2.1-13

FIA #	CHAINAGE:	DISCIPLINE #

TITLE

TYPICAL PUMP STATION WITHOUT PIGGING FACILITIES

SCALE	DWG No	REV
N.T.S.		1

LAST PLOT DATE:
Wed, 05 Nov 2008 - 5:56pm

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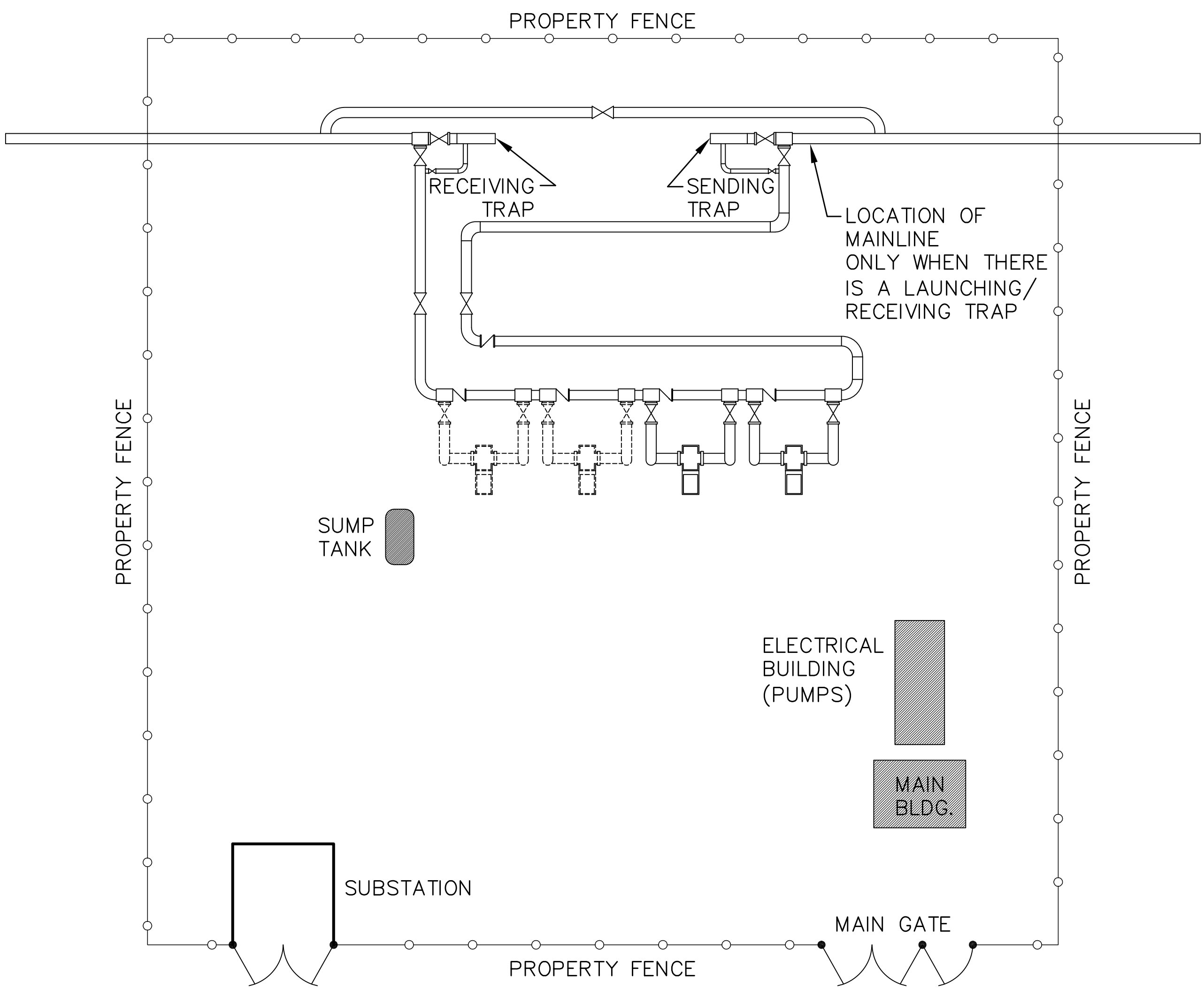

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REVISIONS	
1	REMOVED SEPTIC TANK; RENUMBERED FIG.

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JOE A. NELSON (NAME) 9/08/08 (DATE)

CHECKED BY:
APPROVED BY:

FIGURE 2.1-14

FIA #	CHAINAGE:	DISCIPLINE #

TITLE
TYPICAL PUMP STATION WITH PIGGING FACILITIES

SCALE	DWG No	REV
N.T.S.		1

LAST PLOT DATE:
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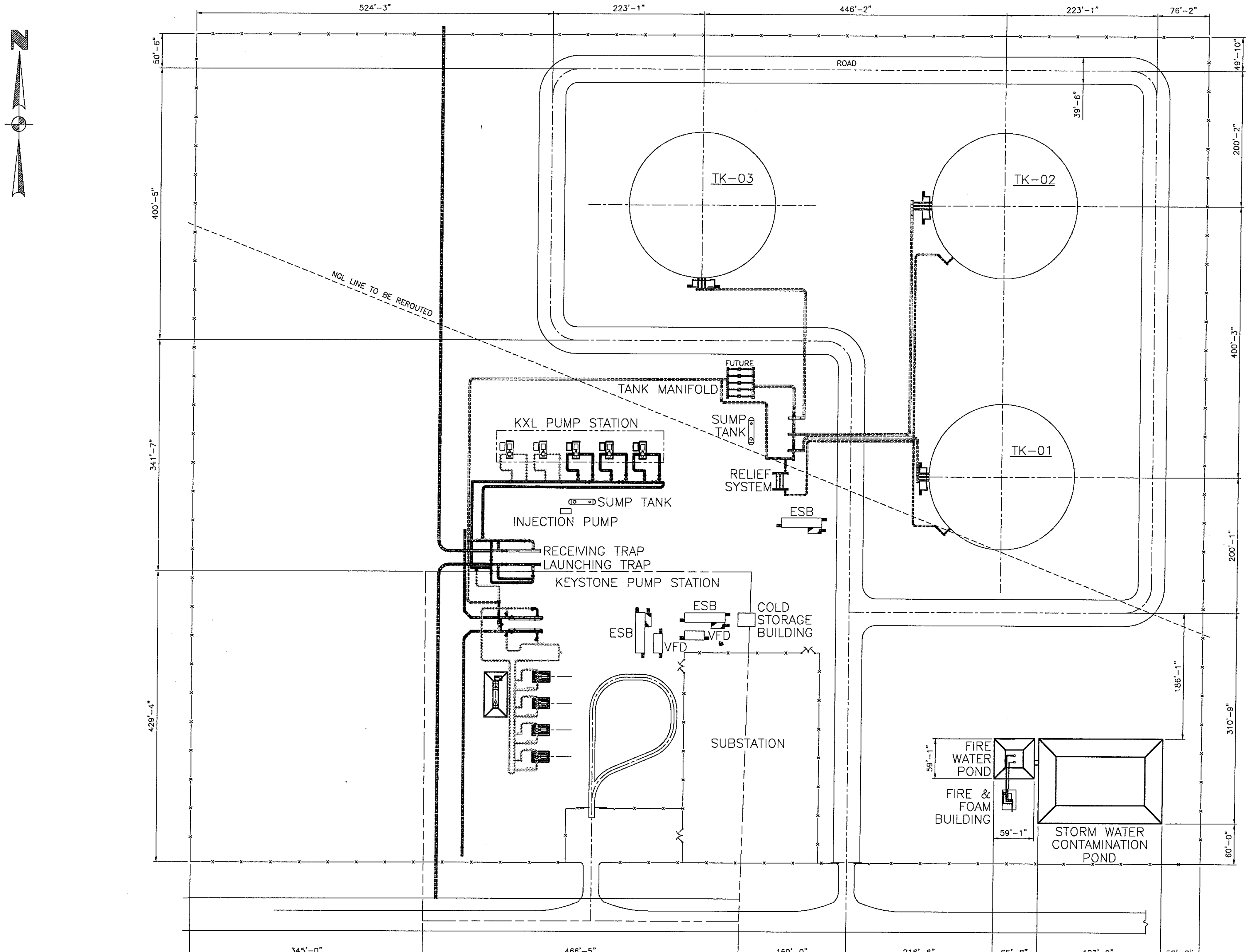

NOTE:
1. ALL DIMENSIONS ARE IN IMPERIAL.

LEGEND:

UNDER GROUND PIPING

ABOVE GROUND PIPING

PROPERTY LINE

FENCE LINE

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
PA	2008-09-17	ISSUED FOR REVIEW	020192	MC		CNN		DV	SLI

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL	
		DATE
REV. NO.	DATE	PERMIT NUMBER:

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STEELE CITY PUMP STATION

FIA # 1814	CHAINAGE:	DISCIPLINE # 01

STEELE CITY TANKFARM
GENERAL ARRANGEMENT PLAN

SCALE 1"=80'-0"	DRAWING No 020192-SCTF-40D1-0001	REV PA

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

PLOTTED SIZE: ANSI D (22x34)

TC_UD_BR.DWG 22X34

TIME DESIGNFILE ID

Table 2.1-8 Summary of Electrical Power Supply Requirements for Pump Stations and Tank Farm

Pump Station No.	MP (0 at US border)	Transformer Size (MVa)	Utility Supply (kV)	Estimated Power Line Lengths (miles)	Power Provider
Steele City Segment					
Montana					
9	1.2	20/27/41	115	57.1	Big Flat Electric Cooperative
10	49.3	20/27/42	115	51.0	Valley Electric Cooperative
11	98.3	20/27/43	115	11.9	McCone Electric Cooperative
12	148.9	20/27/44	69	3.3	McCone Electric Cooperative
13	199.0	20/27/45	115	9.6	Tongue River Electric Cooperative
14	236.9	20/27/46	115	5.1	Montana-Dakota Utilities Company
15	280.3	20/27/47	115	19.0	Grand Electric Cooperative
South Dakota					
16	333.4	20/27/48	69	12.0	Grand Electric Cooperative
17	387.1	20/27/49	115	10.3	Grand Electric Cooperative
18	439.9	20/27/50	230	10.3	West Central Electric Cooperative
19	494.6	20/27/51	115	18.5	West Central Electric Cooperative
20	545.2	20/27/52	115	16.1	Rosebud Electric Cooperative
21	590.3	20/27/53	115	14.2	Rosebud Electric Cooperative
Nebraska					
22	640.7	20/27/54	115	7.4	Nebraska Public Power District
23	693.1	20/27/55	115	23.1	Nebraska Public Power District
24	750.0	20/27/56	115	10.1	Nebraska Public Power District
25	799.2	20/27/57	115	14.2	Nebraska Public Power District
26	850.2	20/27/58	115	13.3	Nebraska Public Power District
Keystone Cushing Extension					
Kansas					
27	899.3	20/27/59	115	10.2	Westar Energy
29	993.7	20/27/61	161	10.2	Westar Energy
Gulf Coast Segment					
Oklahoma					
32	0	20/27/64	138	6.0	To Be Determined
33	49.5	20/27/65	138/138	0.1	Canadian Valley Electric Cooperative/PSO
34	95.3	20/27/66	138/138	4.7	People’s Electric Cooperative/PSO
35	146.7	20/27/67	138	5.5	Southeastern Electric Cooperative
Texas					
36	193.3	20/27/68	69	7.5	Lamar Electric Cooperative
37	239.2	20/27/69	138	8.2	Wood Co Electric Cooperative

Pump Station No.	MP (0 at US border)	Transformer Size (MVa)	Utility Supply (kV)	Estimated Power Line Lengths (miles)	Power Provider
38	283.5	20/27/70	138	0.2	Cherokee County Electric Cooperative
39	332.5	20/27/71	138	9.4	Cherokee County Electric Cooperative
40	376.9	20/27/72	138	1.5	Sam Houston Electric Cooperative
41	431.2	20/27/73	230	0.4	Sam Houston Electric Cooperative

MVa = Mega Volt amperes

Construction Workforce and Schedule

Keystone proposes to begin construction of the Gulf Coast Segment in 2010 and the Steele City Segment and Houston Lateral the following year. The Project is planned to be placed into service in phases. The Gulf Coast Segment and Houston Lateral are planned to be in service in 2011 and the Steele City Segment is planned to be in-service in 2012. Construction of new pump stations along the Keystone Cushing Extension will coincide with construction of the Project. Keystone anticipates a peak workforce of approximately 3,500 to 4,200 construction personnel. Construction personnel will consist of Keystone employees, contractor employees, construction inspection staff, and environmental inspection staff.

Tank farm construction will involve approximately 30 to 40 construction personnel over a period of nine to 12 months concurrent with the Steele City Segment construction.

Keystone is planning to build the Project in 13 construction spreads (Table 2.1-9). Construction activity will occur simultaneously on spreads within each phased segment of the Project.

Keystone anticipates 500 to 600 construction and inspection personnel associated with each spread. Except for the Houston Lateral which will require approximately 250 workers. Each spread will require 6 to 8 months to complete. Construction of new pump stations will require 20 to 30 additional workers at each site. Construction of all pump stations will be completed in 18 to 24 months.

Keystone, through its construction contractors and subcontractors, will attempt to hire temporary construction staff from the local population.

Table 2.1-9 Construction Spreads Associated with the Project

Spread Number	Location	Approximate Length of Construction Spread (miles)
Steele City Segment		
Spread 1	MP 0 to MP 123	123
Spread 2	MP 123 to MP 247	124
Spread 3	MP 247 to MP 372	125
Spread 4	MP 372 to MP 489	117
Spread 5	MP 489 to MP 611	122
Spread 6	MP 611 to MP 732	121
Spread 7	MP 732 to MP 850	118
Gulf Coast Segment		

Table 2.1-9 Construction Spreads Associated with the Project

Spread Number	Location	Approximate Length of Construction Spread (miles)
Spread 1	MP 0 to MP 120	120
Spread 2	MP 120 to MP 242	122
Spread 3	MP 242 to MP 320	78
Spread 4	MP 320 to MP 411	91
Spread 5	MP 411 to MP 476	65
Houston Lateral		
Spread 6	MP 0 to MP 47	47

2.1.10.4 Future Plans and Abandonment

The Project is expected to operate for approximately 50 years. Keystone has not identified plans for abandonment of these facilities at this time. If abandonment of any facility is proposed in the future, the abandonment will be subject to approvals by state and federal agencies having jurisdiction. Abandonment will be implemented in accordance with then-applicable permits, approvals, codes, and regulations.

2.1.11 Operation and Maintenance

Keystone will operate and maintain the Project's facilities in accordance with 49 CFR Parts 194 and 195 and other applicable federal and state regulations. Operation and maintenance of the pipeline system in most cases will be accomplished by Keystone personnel. Keystone estimates that operation of the pipeline will require 20 employees in the US.

2.1.11.1 Normal Operations and Routine Maintenance

The pipeline will be inspected periodically via aerial and ground surveillance as operating conditions permit, but no less frequently than as required by 49 CFR Part 195. These surveillance activities will provide information on possible encroachments and nearby construction activities, erosion, exposed pipe, and other potential concerns that may affect the safety and operation of the pipeline. Evidence of population changes will be monitored and High Consequence Areas (HCAs) identified as necessary. MLVs will be inspected twice annually and the results documented.

In order to maintain accessibility of the permanent easement and to accommodate pipeline integrity surveys, woody vegetation along the pipeline permanent easement will be periodically cleared. Cultivated crops will be allowed to grow in the permanent easement. Trees will be removed from the permanent easement. Keystone will use mechanical mowing or cutting along its permanent easement for normal vegetation maintenance. Trees along the paths of areas where the pipe was installed via HDDs will only be cleared as required on a site specific basis.

Keystone will monitor the ROW to identify any areas where soil productivity has been degraded as a result of pipeline construction and reclamation measures will be implemented to rectify any such concerns. Applicable reclamation measures are outlined in the CMRP (Appendix I).

Supervisory Control and Data Acquisition (SCADA) facilities will be located at all pump stations remotely operated and delivery facilities. The pipeline SCADA system will allow the control center to perform the following functions:

- remote reading of MLV positions;

- remote starting and stopping at pump stations;
- remote reading of tank levels;
- remote closing and opening of MLVs;
- remote reading of line pressure and temperature; and
- remote reading of delivery flow and total flow.

The Project will have a control center manned by an experienced and highly trained crew 24 hours per day every day of the year. A fully redundant backup control center will be constructed and available as needed.

Real time information communication systems, including backup systems, will provide up-to-date information from the pump stations to the control center plus the ability to contact field personnel. The control center will have highly sophisticated pipeline monitoring systems.

2.1.11.2 Abnormal Operations

Keystone will comply with the Code of Federal Regulations including 49 CFR Part 195.402 with respect to the preparation of manuals and procedures for responding to abnormal operations. Section 195.402(a) requires a pipeline operator to prepare and follow a manual of written procedures for conducting normal operations and maintenance activities and handling abnormal operations and emergencies. Section 195.402(d) (Abnormal Operation) requires the manual to include procedures to provide safety when operating design limits have been exceeded. These include:

- Responding to, investigating, and correcting the cause of:
  - Unintended closure of valves or shutdowns;
  - Increase or decrease in pressure or flow rate outside normal operating limits;
  - Loss of communications;
  - Operation of any safety device; and
  - Any other malfunction of a component, deviation from normal operation, or personnel error which could cause a hazard to persons or property.
- Checking variations from normal operation after abnormal operation has ended at sufficient critical locations in the system to determine continued integrity and safe operation.
- Correcting variations from normal operation of pressure and flow equipment and controls.
- Notifying responsible operator personnel when notice of an abnormal operation is received.
- Periodically reviewing the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation and taking corrective action where deficiencies are found.

<u>SCADA and Leak Detection</u>

Keystone will utilize a Supervisory Control and Data Acquisition (SCADA) system to remotely monitor and control the pipeline system. In summary, highlights of Keystone's SCADA system will include:

- Redundant fully functional backup system available for service at all times
- Automatic features installed as integral components within the SCADA system to ensure operation within prescribed pressure limits

- Additional automatic features installed at the local pump station level will also be utilized to provide pipeline pressure protection in the event communications with the SCADA host are interrupted

Keystone will also have a number of complimentary leak detection methods and systems available within the Operations Control Center (OCC), which is manned on a 24(hrs/day) x 7(days/week) basis. These methods and systems are overlapping in nature and progress in leak detection thresholds. The leak detection methods are as follows:

- Remote monitoring performed by the OCC Operator, which consists primarily of monitoring pressure and flow data received from pump stations and valve sites fed back to the OCC by the Keystone SCADA system. Remote monitoring is typically able to detect leaks down to approximately 25 percent - 30 percent of pipeline flow rate.
- Software based volume balance systems that monitor receipt and delivery volumes. These systems are typically able to detect leaks down to approximately 5 percent of pipeline flow rate.
- Computational Pipeline Monitoring or model based leak detection systems that break the pipeline system into smaller segments and monitor each of these segments on a mass balance basis. These systems are typically capable of detecting leaks down to a level approximately 1.5 percent - 2 percent of pipeline flow rate.
- Computer based, non real time, accumulated gain/(loss) volume trending to assist in identifying low rate or seepage releases below the 1.5 to 2 percent by volume detection thresholds.
- Direct observation methods, which include aerial patrols, ground patrols and public and landowner awareness programs that are designed to encourage and facilitate the reporting of suspected leaks and events that may suggest a threat to the integrity of the pipeline.

Emergency Response Procedures

Keystone will be required to prepare site-specific ERPs for the system, which will be submitted to and approved by the Office of Pipeline Safety (OPS) prior to operation. Keystone has prepared a comprehensive ERP for the Keystone Pipeline Project and submitted it to PHMSA for review and approval. Upon receipt of PHMSA approval, Keystone will use the ERP as the basis for preparation of an ERP specific to the Keystone XL Project, incorporating adjustments to reflect Project-specific factors. At that time, Keystone will submit the Keystone XL ERP to PHMSA for approval.

Keystone is required to notify immediately the National Response Center (NRC) in the event of a release of crude oil that: (1) violates water quality standards; (2) creates a sheen on water; or (3) causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines (40 CFR Part 112). In addition to the NRC, Keystone will make timely notifications to other agencies, including the appropriate local emergency planning committee (LEPC), sheriff's department, the appropriate state agency, the USEPA, and affected landowners.

Under the National Contingency Plan, the USEPA is the lead federal response agency for oil spills occurring on land and in inland waters. The USEPA will evaluate the size and nature of a spill, its potential hazards, the resources needed to contain and clean it up, and the ability of the responsible party or local authorities to handle the incident. The USEPA will monitor all activities to ensure that the spill is being contained and cleaned up appropriately. All spills meeting legally defined criteria (see criteria above per 40 CFR Part 112) must be monitored by the USEPA, even though most spills are small and cleaned up by the responsible party. In the unlikely event of a large spill, Keystone and its contractors will be responsible for recovery and cleanup. The usual role of local emergency responders is to notify community members, direct people away from the hazard area, and address potential impacts to the community such as temporary road closings.

A fire associated with a spill is relatively rare. According to historical data (OPS 2005), only about four percent of reportable liquid spills are ignited. In the event of a fire, local emergency responders will execute the roles listed above and firefighters will take actions to prevent the crude oil fire from spreading to residential areas. Local emergency responders typically are trained and able to execute the roles described above without any additional training or specialized equipment. Keystone also will work with emergency response agencies to provide pipeline awareness education and other support.

<u>Remediation</u>

Corrective remedial actions will be dictated by federal regulations and enforced by the USEPA and OPS and the appropriate state agencies. Required remedial actions may range from the excavation and removal of contaminated soil to allowing the contaminated soil to recover through natural environmental fate processes (e.g., evaporation, biodegradation). Decisions concerning remedial methods and extent of the cleanup will account for state-mandated remedial cleanup levels, potential effects to sensitive receptors, volume and extent of the contamination, potential violation of water quality standards, and the magnitude of adverse impacts caused by remedial activities.

In the event of a spill, several federal regulations define the notification requirements and response actions, including the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300), the CWA, and the Oil Pollution Act. At the most fundamental level, these interlocking programs mandate notification and initiation of response actions in a timeframe and on a scale commensurate with the threats posed. The appropriate remedial measures will be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

2.2 No Action Alternative

Under the no-action alternative, Keystone will not request approval for, nor construct the proposed Project. If the proposed facilities are not constructed, the short- and long-term impacts identified in this Environmental Report will not occur; however, Keystone will not be able to meet the demonstrated market need within the required timeframe. Moreover, shippers will seek other means to move their product or shut in production. It is purely speculative to predict the resulting effects and actions that could be taken by another entity or the shippers as well as any associated direct and indirect environmental impacts. However, it is clear that the demand for crude oil in the US overall and in the area served by the Project is increasing. Thus, not building the proposed facilities could limit some or all of the access to additional crude oil supplies, thus jeopardizing the benefits to be provided by the Project.

2.3 System Alternatives

The following pipeline system alternatives could potentially provide incremental crude transportation service from Canada to the US Gulf Coast (USGC) market. To be considered viable alternatives, system alternatives must meet the purpose and need of the Project in terms of general receipt and delivery points, volumes delivered, and timeframes for deliveries.

<u>Altex Proposal</u>

Altex was announced in 2005 and consists of a proposed direct, 36-inch, 2,350 mile greenfield pipeline system between Fort McMurray, Alberta and the USGC. The proposed initial capacity is 425,000 bpd of heavy crude with suggested in service dates as early as 2013 and as late as 2014 (CAPP, June 2008). The estimated capital cost of the project is $5.3 billion. Altex has been working with shippers to obtain contract volumes, define a route and refine preliminary design (altex-energy.com). To date no commercial commitments or regulatory permit applications have been announced.

<u>KinderMorgan/TEPPCO Chinook/Maple Leaf Proposal</u>

In December of 2007 KinderMorgan and TEPPCO announced the proposed Chinook/Maple Leaf pipeline, a

direct 36-inch, 2,050 mile pipeline system between Hardisty, Alberta and the USGC. The proposed pipeline would have capacities of 440,000 bpd between Hardisty and Cushing, and 550,000 bpd between Cushing and the USGC. The most recent stated in-service date for the project is late 2011 or early 2012 (CAPP, June 2008). No published capital costs are available; however, it has been stated that the project will cost several billion dollars, but not more than $5 billion (globeandmail.com). KinderMorgan proposes to construct the portion between Hardisty and Cushing (Chinook), while TEPPCO would construct the portion between Cushing and the USGC (Maple Leaf). To date no commercial commitments or regulatory permit applications have been announced.

ExxonMobil/Enbridge Texas Access Proposal

ExxonMobil and Enbridge jointly proposed a 768 mile 30-inch pipeline between Patoka, Illinois and the USGC including an 88 mile 24-inch lateral to the East Houston area. The proposed initial capacity of the pipeline is 445,000 bpd with a suggested in-service date as early as mid 2011. The estimated capital cost for the project is stated as $2.6 billion (enbridge.com/usgulfcoast). In December 2007, Exxon and Enbridge announced the commencement of a solicitation for binding shipper commitments. In July 2008, Enbridge announced that the Texas Access proposal will be delayed until 2014 (texasaccesspipeline.com). To date no commercial commitments or regulatory permit applications have been announced.

Enbridge Trailbreaker Proposal

Enbridge's Trailbreaker refers to a proposal to ship crude to the northeast US, then transfer crude by ship from the northeast US to the USGC by as early as mid 2010. The key components of the proposed project are:

- the reversal of Enbridge's Canadian mainline from Sarnia, Ontario to Montreal, Quebec;
- expansions to Enbridges's Lakehead pipeline from the Griffith Terminal near Chicago, Illinois to Sarnia;
- increasing the capacity on Enbridge's line 7 from Sarnia to Westover, Ontario;
- reversal of the Portland Pipeline from Montreal to Portland, Maine; and
- transportation by tanker between Portland and the USGC market.

The stated potential capacity of the Trailbreaker proposal is 200,000-230,000 bpd of heavy crude (enbridge.com/usgulfcoast/trailbreaker). The capital cost for the project is estimated to be $350 Million (Bloomberg.com). To date no commercial commitments or regulatory permit applications have been announced.

Enbridge/BP Proposal

Enbridge and BP recently announced plans to develop a new delivery system to transport heavy crude oil from Flanagan, Illinois, to Houston and Texas City, Texas with an initial total system capacity of 250,000 barrels per day by late 2012. The proposed delivery system would connect to Enbridge's Lakehead pipeline system at Flanagan, utilize an existing BP pipeline system between Flanagan and Cushing, Oklahoma and new pipeline construction south of Cushing to connect to markets in Houston and Texas City, Texas. The joint investments of the phased capacity additions are expected to be between $1 billion and $2 billion (bp.com). To date no commercial commitments or regulatory permit applications have been announced.

ExxonMobil Pegasus Pipeline

Pegasus is an ExxonMobil crude oil pipeline currently providing crude oil transportation service between Patoka, Illinois and Nederland, Texas. The capacity of the pipeline is 66,000 bpd in heavy crude service, of which 50,000 bpd is committed capacity. Pegasus is contemplating a potential incremental expansion of 30,000 bpd in order to increase the shipment of heavy crude to the USGC. The expansion could take place as early as 2009 (Oilgram news, 03/09/2007). No information is publicly available regarding the estimated capital cost of the project. To date no commercial commitments or regulatory permit applications have been announced.

System Alternatives Comparison

In comparison to the pipeline alternatives including the Altex and Chinook/Maple Leaf pipeline proposals, which reflect the more direct routing alternatives, the total length of the Keystone project at 2000 miles shorter, providing shippers advantages in both inventory and transit time from an established crude oil supply hub. Compared to these proposals, the Project has advanced field studies, has commenced the regulatory approval process, and has advanced procurement processes that would allow the Gulf Coast segment to be available for service by 2011.

In comparison to the remaining alternatives, the Gulf Coast segment of the Project is proposed to be in service in 2011 with the Steele City segment in-service by 2012, well before 2014 as proposed by Texas Access and in advance of the end of 2012 as proposed in the Enbridge/BP alternative. While the Trailbreaker and Exxon Pegasus proposals have more near-term proposed in-service dates, they are not capable of providing the level of incremental capacity to the USGC as requested by shippers. Notably, the Project already has market support for 380,000 bpd of long-term commitments, a demand level which significantly exceeds the proposed capacity of both the Trailbreaker and Pegasus expansion alternatives.

The Project is the only identified alternative that has obtained definitive market support in the form of long-term, binding contractual commitments totaling 380,000 bpd, which enables the Project to proceed with regulatory applications and, pending successful regulatory and environmental approvals, with construction of the pipeline.

Shippers – producers, marketers or refiners - evaluate the merits of various pipeline proposals and ultimately decide which projects to support. Shippers have expressed material interest in the Project and in securing additional crude oil pipeline capacity through binding long-term contract commitments. These binding commitments demonstrate a material endorsement of support for the Project, its economics, proposed route and target market, as well as the need for incremental pipeline capacity and access to Canadian crude supplies as an alternate to existing foreign supplies to the US.

2.4 Project Alternatives

2.4.1 Pipeline Route Alternatives

2.4.1.1 General

The proposed route for the Project was developed through an iterative, multidisciplinary route selection process. This process involved the systematic identification of objectives, control points, collection of data, review of alternatives and continual reassessment of these factors as refinement occurred. Additionally, the process unfolded in two distinct phases given modifications to basic Project objectives which had significant impacts on suitable routing alternatives.

The process followed by Keystone is described in the following text.

2.4.1.2 Route Selection and Alternatives Analysis

Several high-level objectives influenced the selection of the proposed Project pipeline route. The location of the source of the crude oil in Canada, the location of planned border crossing facilities into the US (adjacent to the Northern Border pipeline border crossing at Morgan, Montana), and the delivery points for the crude oil (Cushing, Oklahoma, and the Nederland and Houston Ship Channel areas in Texas) influenced the initial route proposed for the Project.

Data Gathering

Based on these basic objectives, a general geographic region of interest was established. Data was then gathered for this region. These data included the following:

- recent (2008) high resolution aerial photography, as well as aerial imagery from 2004 and 2005;
- United States Geological Survey (USGS) Topographic Quadrangle Maps;
- Delorme State Atlas and Gazetteers;
- Soil Survey Geographic (SSURGO) Database;
- National Land Cover Database (NLCD 2001);
- GIS layers containing public data obtained from various county, state, and federal government websites; commercial background data provided by ESRI; and internal existing utility data;
- NWI Database and Mapping; and
- County soil surveys.

All data was compiled into a GIS-based constraint data set of the area to support the identification and evaluation of route options.

Constraints and Opportunities

A number of primary and secondary constraints were identified to guide the route selection process. The route should avoid the constraints whenever possible and minimize contact when unavoidable. The constraints include:

Primary

- co-location;
- public lands (federal and state);
- large waterbodies and water control structures;
- lands with permitting processes that could affect schedule;
- extreme terrain;
- large wetland complexes;
- urban areas;
- properties listed on the NHRP; and
- wildlife refuges and management areas.

Secondary

- water crossings;
- wetland crossings;
- waterfowl production areas;
- irrigated croplands;
- bedrock;
- rural communities;

- aquifers;
- extensive forested areas, including commercial forest lands; and
- residences and associated features such as driveways, outbuildings, and wind breaks.

Opportunities refer to those features which are favorable features for pipeline routing and generally serve to simplify construction and decrease disturbance. These include:

- existing linear features such as pipelines (preferred), power lines and roadways;
- flat or gently rolling terrain;
- soils which can be readily excavated; and
- areas lacking forested vegetation.

Definition of Control Points

The following control points served to define the route:

- US/Canada border crossing near Morgan, Montana;
- the Fort Peck Reservoir, Montana;
- crossing the Niobrara River at locations not designated as wild and scenic;
- opportunity to connect with the Keystone Cushing Extension, a portion of the Keystone Pipeline Project;
- delivery point at Nederland, Texas; and
- delivery point at Moore Junction, Texas.

Route Alternatives Identification

Based on the above information and objectives, a number of route alternatives and alternative route segments were developed. These routes and route segments met the basic Project objectives and respected the constraints and opportunities to varying degrees.

The following paragraphs provide an overview of the characteristics of each of the major route alternatives and alternative route segments. These alternatives are illustrated on Figures 2.4-1 through 2.4-4.

Environmental Constraints

The most significant environmental constraints affecting the routing analysis along the Gulf Coast Segment are national and state forests and parks, wildlife habitats, tribal lands, surface rock outcrops, steel ascent/descent slopes, and high consequence areas (HCAs). Some of these are:

- The Caddo National Grassland;
- The Davy Crockett National Forest;
- The Angelina National Forest;
- The Sam Houston National Forest;

- The Big Thicket National Preserve; and
- Expansive forested wetland complexes along the extreme southern portion of the study area.

Avoidance Areas

Routing assessed and selected alternatives around the following land use categories to the extent practical:

- Indian Reservations, Tribal Lands;
- Other publicly owned lands including, US Fish and Wildlife Service (USFWS), State Lands, National Park Service (NPS), USACE, DOD, etc.;
- Urban areas and residences and farmsteads;
- Military bases;
- Residences and farmsteads;
- Rural schools and recreational areas;
- Municipal sewage ponds;
- Industrial facilities (e.g., rail yards, warehouses), except when in industrial corridors;
- Cemeteries;
- Oil/natural gas fields; and
- Well heads and irrigation pivot points.

Co-location Areas

To the extent practicable, alternatives were sited to co-locate with the following existing facilities:

- Existing pipelines;
- Existing railways;
- Various existing roadways; and
- Electrical power lines and other utilities.

2.4.1.3 Steele City Segment Alternatives

Western Alternative

The western alternative would enter the US at Morgan, Montana, and run southwest through Montana, South Dakota, Nebraska, Kansas, and Oklahoma to reach the delivery point at Cushing, Oklahoma. The route would then run south to Nederland, and Moore Junction. The total length of this route would be 1,110 miles in the US. This route would cross northeast of Fort Peck Reservoir and avoid crossing reaches of the Niobrara River designated wild and scenic.

Most of the northern portion of the western alternative, from the US/Canada border to the delivery point at Cushing, would be constructed within new ROW; only the northernmost portion of the alternative would parallel the existing Northern Border Pipeline. South of Cushing to Nederland and Moore Junction, this alternative route would follow multiple ROWs. New pipeline would be constructed for the entire route. This alternative was not analyzed further because it failed to make use of the Cushing Extension thereby resulting in approximately 300 additional miles of greenfield pipeline construction.

Steele City Segment Route A

The Steele City Segment Route A co-locates with an existing and proposed pipeline for the entire pipeline route. This alternative co-locates with the Northern Border Pipeline from the US/Canada border through Montana, North Dakota, and into South Dakota, intersecting with the under construction Keystone Pipeline. The route then co-locates with the Keystone Pipeline through South Dakota and ends in southern Nebraska at the Platte Pipeline. At this location, the alternative would connect with the Keystone Cushing Extension of the Keystone Pipeline Project.

Wilderness Study Area - Bitter Creek (MP 44 to MP 48)

Under the Federal Land Policy and Management Act, the BLM conducted studies on several tracts of land with the intention of designating certain parcels as "wilderness study areas." One of these properties is the Bitter Creek WSA, which consists of approximately 59,660 acres of land. The area is known to contain a variety of vegetation types and wildlife habitat in the state of Montana. Currently, the BLM manages the protection of WSAs. The BLM will be the primary agency that will determine the possibility and mitigation involved with crossing this WSA.

Tribal lands – Fort Peck Indian Reservation (MP 58 to MP 146)

Fort Peck Indian Reservation is under the jurisdiction of the Bureau of Indian Affairs (BIA). Obtaining ROW easements across BIA lands can require significantly more time and processing than private or other federally managed lands.

Steele City Segment Route A1A

Steele City Segment Route A1A is an additional alternative to the Steele City Segment Route Option A. As in the Steele City Segment Route Option A, this alternative co-locates with the Northern Border Pipeline along the east-west portion of the route and with the proposed Keystone Pipeline along the north-south segment except in northeastern Montana where the route runs to the north around the Fort Peck Indian Reservation.

The route deviates from the Steele City Segment Route Option A in central Valley County, Montana, by continuing to run east just to the north of the Fort Peck Indian Reservation. The route then turns south at the eastern edge of the reservation in Sheridan County, Montana, and runs to the west of the Medicine Lake area through an area identified post-reconnaissance as a wildlife refuge. This area will be discussed later in the report. The route crosses into Roosevelt County, Montana, turning to the southeast and crosses into Williams County, North Dakota. The route joins back with the Steele City Segment Route Option A just north of the Missouri River crossing at the Williams-McKenzie County border in North Dakota and continues to co-locate with the Northern Border Pipeline.

Medicine Lake National Wildlife Refuge (Approximate MP 169)

The Medicine Lake National Wildlife Refuge (NWR) was established in 1935 to provide breeding habitats for migratory birds and other wildlife. The Refuge is managed by the USFWS. It lies within the highly productive prairie pothole region and has relief typical of the glacial drift prairie. Medicine Lake NWR was recognized by the American Bird Conservancy as one of the "Top 100 Globally Important Bird Areas in the US" and was designated as a National Natural Landmark in 1980.

The refuge is home to a diverse array of native prairie and wetland-associated wildlife species. More than 273 species of birds were spotted in the NWR and 125 bird species breed there. The 31,660-acre refuge contains 22 natural and artificial lakes and managed impoundments, along with numerous small wetlands or "potholes" encompassing more than 13,000 wetland acres. NWR uplands consist of gently rolling mixed-grass prairie with a few trees found in riparian areas. The rolling hills and sand dunes around Medicine Lake make up the most extensive sandhill formation in Montana.

NWR grasslands and wetlands are prime breeding areas for waterfowl, with 17 species producing 40,000 offspring annually. It also is an important resting area for migrating birds, including sandhill cranes, Canada geese, white-fronted geese, tundra swans, and many duck species. The American white pelican nesting colony in the refuge is one of the largest in North America, with about 10,000 birds breeding there each summer. Large populations of rare grassland birds such as Baird's sparrows, Sprague's pipits, and chestnut-collared longspurs nest on refuge prairies, attracting birdwatchers from all over the US.

Additionally, some year-round residents include white-tailed and mule deer, coyote, badger, beaver, muskrat, sharp-tailed grouse, and pheasant. Less frequent visitors include moose, elk, and pronghorn. A wolverine was seen in 1998.

Route Option A1A traverses Diversion Ditch No. 1, a canal that connects the refuge to Big Muddy Creek in Sheridan County, Montana. The field reconnaissance indicates that the ditch is an extension of the refuge, but the surrounding lands are not. The potential impact of this crossing may be minimized or avoided by adjusting the currently proposed alignment, or by using the HDD installation technique across Diversion Ditch No. 1 and/or Lake Creek. Whether or not a pipeline crossing will be allowed at this point is subject to agency discussion and the potential presence of other utility crossings.

Prairie Potholes

Prairie potholes are depressional wetlands (primarily freshwater marshes) often found in the Upper Midwest, especially North Dakota, South Dakota, Wisconsin, and Minnesota, but also in northeastern Montana. This formerly glaciated landscape is pockmarked with an immense number of potholes, which fill with snowmelt and rain in the spring. Some prairie pothole marshes are temporary, while others may be permanent. Here a pattern of rough concentric circles develops. Submerged and floating aquatic plants take over the deeper water in the middle of the pothole while bulrushes and cattails grow closer to shore.

The Upper Midwest is described as being one of the most important wetland regions in the world because of its numerous shallow lakes, marshes, rich soils, and warm summers. The area is home to more than 50 percent of North American migratory waterfowl, with many species dependent on the potholes for breeding and feeding. In addition to supporting waterfowl hunting and birding, prairie potholes also absorb surges of rain, snow melt, and floodwaters, thereby reducing the risk and severity of downstream flooding.

Prairie potholes become more prominent in the eastern portion of the Steele City Route A1A than other Steele City Segment alternative routes. These wetland types typically increase the construction and mitigation costs of construction.

<u>Steele City Segment Route B</u>

This route option enters the US parallel to the Northern Border Pipeline in Phillips County, Montana, running in a southwesterly direction. The route continues to co-locate with the Northern Border Pipeline crossing through the Fort Peck Indian Reservation and then enters North Dakota through Williams County. The route crosses the Missouri River at the Williams-McKenzie County border and again at the Morton-Emmons County border in North Dakota. The route then crosses into McPherson County, South Dakota, continues in a southeasterly direction and crosses the proposed Keystone Pipeline in the northwestern corner of Clark County, South Dakota. The route turns south, co-locating with the proposed Keystone Pipeline through South Dakota, crossing the Missouri River near Yankton, South Dakota. The route enters Cedar County, Nebraska, continuing to co-locate with the Keystone Pipeline until intersecting with the Platte Pipeline in Jefferson County, Nebraska. The route will then interconnect with the proposed Cushing segment of the Keystone Pipeline Project near Steele City.

Department of Defense Property (Approximate MP 87.3)

The US Department of Defense (USDOD) is the underlying owner of a parcel of land on the south and southeastern side of the Missouri River near the confluence with the Milk River. It is a parcel of land that cannot be avoided because the Charles M. Russell NWR lies to the west-southwest and the Fort Peck Indian Reservation lies to the northeast of the proposed crossing. Land in this area appears to be open rangeland with trees and shrubs interspersed on the property. The manager of the land appears to be the BLM.

A crossing of this property will require an easement from the USACE and/or BLM. Because this pipeline will be greater than 24 inches in diameter, Congressional notification will be required and possibly approval. This will necessitate that an easement of this crossing, and all other federal crossings, be filed in the fall of 2008 to make it through Congress before the summer recess in 2009. At this time, based on high-level, non-Project specific discussions, it appears granting an easement for the pipeline will be possible.

Table 2.4-1 summarizes the lengths of the alternatives considered for the northern portion of the Project.

Table 2.4-1 Lengths of the Steele City Segment Route Options (Canadian Border to Cushing, Oklahoma)

Route Option	Route and the Corresponding Alternative	Mileage (new pipe construction)	Mileage (connection to Keystone Cushing Extension)
Western	Western Alternative – direct line to Cushing, Oklahoma	1,110	0
Segment A	Eastern route through Montana, North Dakota, South Dakota, and Nebraska, to connect to the Keystone Cushing Extension at Steele City	920	298
Segment A1A	Eastern route through Montana, North Dakota, South Dakota, and Nebraska, to connect to the Keystone Cushing Extension at Steele City, avoiding BIA lands.	951	298
Segment B	Eastern route through Montana, South Dakota, and Nebraska, to connect to the Keystone Cushing Extension at Steele City.	850	298

2.4.1.4 Gulf Coast Segment

The analysis of Gulf Coast Segment initially included two primary routes and four secondary routes. Based on the Control Points and Opportunities identified for the Project, the routing alternatives concentrated on the most direct route resulting in the alternative considered being routed through Oklahoma and Texas.

<u>Oklahoma</u>

In Oklahoma, the Project start point commences east of Oklahoma City. The Oklahoma area consists of gently rolling topography with east facing escarpments and isolated buttes continuing into southern Oklahoma and gently rolling topography to relatively flat topography with limestone.

The Project area contains several geological faults in Oklahoma, (preferred route locations – Crossing Fault Zone at MP 39.5 to 41, Parallel to Fault at 48.5 to 49.5 and Crossing Fault Zone at 86.5 to 106.5).

The Project area transverses a zone of increased seismic risk in southern Oklahoma and damage resulting from seismic activity in this zone is expected to be moderate.

Agriculture is significant land use, with the primary croplands being wheat and forage/hay. Some oat and corn fields are crossed in Oklahoma.

Based on preliminary analysis, the Project crosses improved pasturelands and hayfields with some locations crossed considered tall grass prairie areas.

Route options cross several large rivers along with several large creeks in Oklahoma before crossing into Texas.

The timberland that is crossed in Oklahoma has low commercial value.

Some urban residential impact could occur near towns such as Stroud, Holdenville, and Centrahoma in Oklahoma.

The main crops encountered will be forage or hay, improved pastures, timber, rice and soybeans. Wheat, sod farming, poultry farming also will be impacted. There are few, if any, landowners participating in the Conservation Reserve Program that involves governmental subsidy to take acreage out of crop production.

The majority of lands crossed in Oklahoma are privately owned and less than one percent of lands that may be crossed are owned by either the state or federal government in Oklahoma.

Texas

In Texas, the Project start point commences east of Dallas – Fort Worth. The Texas area consists of gently rolling topography and sand hills, black prairie, pine barrens to flat lying coastal prairie. There are occurrences of shallow rock in selected areas (preferred route locations – MP 154-200, 200-369 and 405-475). These shallow rock areas typically encountered are fragmented and no blasting is anticipated despite the existence of rock in the area. No special problems are expected with excavation and there may be conditions in localized areas requiring more specialized equipment (blasting, jackhammers or saws).

In Texas, the Project area contains several geological faults (preferred route locations – Crossing Fault Zone at MP 189-207, Crossing Fault Zone at MP 296-308).

The Project area in northeast Texas crosses a zone where minor seismic risk exists and the remainder of east Texas and the Gulf Coast is described as having no seismic risk.

Rice and soybean fields are more prevalent in Texas, with some areas that use flood-and center pivot irrigation.

Based on preliminary analysis, the Project crosses improved pasturelands and hayfields.

Texas route options cross several additional large rivers along with several large creeks in Texas.

Towns like Tyler/Longview, Lufkin, and cities of Beaumont/Port Arthur, and Houston in Texas were avoided by routing around them.

The main crops encountered will be forage or hay, improved pastures, timber, rice and soybeans. Wheat, sod farming, poultry farming will also be impacted. There are few, if any, landowners participating in the Conservation Reserve Program that involves government subsidy to take acreage out of crop production.

The majority of lands crossed in Texas are privately owned and less than one percent of lands are owned by the state government in Texas (Deep Fork Wildlife Management Area and the San Jacinto State Battleground).

Route Alternative Descriptions

Gulf Coast Segment

Two major routes, Gulf Coast Segment Route Options A and B, connected facilities in Cushing, Oklahoma with facilities in Nederland, Texas.

Several shorter segments for the Gulf Coast Segment from Nederland were reviewed to determine which would provide the most practical connection to the Houston Ship Channel. An existing 20-inch Arco products line was considered. A portion of this line could be acquired and utilized as a secondary means of reaching the Houston Ship Channel.

Alternative A

Gulf Coast Segment Alternative A was the initial route identified because it follows an existing 30-inch diameter natural gas pipeline corridor (Texoma) from Cushing to Nederland. Portions of the Texoma line have been sold and are operated by various companies; however the corridor is still intact. This route is the shorter between Cushing and Nederland at approximately 456 miles.

Alternative A was adjusted during feasibility analysis to the west to avoid the developed, urban area and cities associated with Longview, Tyler, and Nacogdoches, Texas and the Angelina National Forest. Attention also was given to oil and gas activity and abandoned fields.

Alternative A is co-located to four other utility corridors (pipeline and electric transmission) and can be summarized as approximately 93.5 percent co-located with other utility ROWs. This route is approximately 394.9 miles, or 86.6 percent, co-located with existing pipelines and approximately 31.3 miles, or 6.9 percent, co-located with electric transmission lines.

There are two greenfield areas approximately 29.8 miles, or 6.5 percent, not co-located, allowing the avoidance of communities of Longview, Tyler, and Nacogdoches, Texas and the Angelina National Forest.

Alternative A crosses approximately 21 major Roads, 485 minor roads, 104 major streams/waterbodies, 131 minor streams/waterbodies, 16 railroads, 49 power lines, 40 pipelines (Data is from Pennwell database).

Alternative A is in a less urban area which implies potentially easier construction, fewer landowner issues, and less organized resistance to the pipeline.

Conversely, the southern portion of Alternative C crosses extensive wetlands and forested wetlands.

Alternative B

Gulf Coast Segment Alternative B is the secondary alternative considered that would connect facilities in Cushing, Oklahoma with facilities in Nederland, Texas. Alternative B is longer between Cushing and Nederland at approximately 486 miles. Alternative B is west of Alternative C and therefore passes closer to Dallas-Ft. Worth metropolitan area. A portion of Alternative B is co-located with the Seaway Pipeline for approximately 190 miles south of Cushing, Oklahoma and was adjusted to avoid Lake Texoma and remain east of Durant, Oklahoma.

Alternative B is co-located to 10 pipeline ROWs and 1 electric transmission line, resulting in approximately 97.8 percent co-located with other utility ROWs. Specifically, Alternative B is approximately 458.3 miles, or 94.3 percent, co-located with existing pipelines and approximately 17 miles, or 3.5 percent, co-located with electric transmission lines.

There is one greenfield segment, approximately 10.7 miles, or 2.2 percent, not co-located which is necessary to avoid development and congestion.

Alternative B consists of 24 major roads, 559 minor roads, 94 major streams/waterbodies, 154 minor streams/waterbodies, 24 railroads, 63 power lines and 72 pipelines (Data is based on Pennwell information).

Alternative B does involve a potential crossing of the Big Thicket Natural Preserve, a National Park Service owned park.

Alternative A and B Comparison

Alternative B crosses less wetland areas than Alternative Option A. Thus constructability might be more favorable and there would be less regulatory obstacles. Conversely, Alternative B would pass closer to the Dallas area implying greater land costs and potentially organized resistance to the pipeline.

Issues associated with Alternative A included extensive timbered wetlands and overall wetland areas on the southern portion of the route. The southern portion of Alternative B encounters fewer timbered wetlands and fewer wetlands.

The majority of lands crossed by the Alternative A are privately owned. Less than one percent of lands are owned by either the State of Oklahoma or State of Texas.

Conclusion and Selected Alternative

A combination of Alternative A and B, with some detailed routing, was determined to provide the most sensible alternative to connect Cushing and Nederland. The combined Alternative A and B is now designated as the preferred route alternative for the Gulf Coast Segment and was subsequently surveyed for this Environmental Report.

The preferred route incorporates the advantages of the northern two-thirds of Alternative A and the southern one-third of Alternative B. The less urban construction to north coupled with the less timbered wetlands to the south should provide the most cost-effective route. The preferred is 474 miles in length and specifically, consists of 454.2 miles, or 95.8 percent, co-located with other pipelines (14 different pipelines) and 19.8 miles, or 4.2 percent co-located with electric transmission lines (1 electric transmission corridor).

Paralleling the Old Texoma Pipeline in the state of Oklahoma and North Texas should benefit the Project. Co-location is generally viewed favorably by landowners. It requires less clearing when crossing timbered tracts. Landowners generally prefer utility easements be in one place on their property.

The Big Thicket National Preserve and associated wetland complexes as previously noted are considered as an environmental constraint for the preferred but were avoided by placing the pipeline into the Texas highway ROW via an HDD.

The preferred route potentially requires no break out tanks from a design standpoint and traverses approximately 114.3 miles of wetland along the entire route from Cushing, Oklahoma to Nederland, Texas.

The preferred route traverses a number of active and inactive oil and gas fields and there may be historical recorded or unrecorded occurrences of contamination, along the initial 100 miles, south of Cushing, Oklahoma. These issues occur less frequently along the remainder of the route to Nederland, Texas.

2.4.1.5 Houston Lateral Alternatives

Houston Lateral Alternative A

Alternative A was initially developed as a lateral from the Gulf Coast Segment Alternative B to get to the Houston Ship Channel. Alternative A was then refined to facilitate all Gulf Coast alternatives analyzed and resulted in an approximately 75 mile route to the Houston Ship Channel.

Alternative A is co-located with other utilities that consist of 72.7 miles, 96.9 percent, co-located with other utilities (5 pipelines and multiple pipeline/electric transmission corridors). The remaining 2.3 miles, 3.1 percent, would be routed along an existing roadway and railway.

Alternative A consists of 3 major roads, 74 minor roads, 10 major streams/waterbodies, 20 minor streams/waterbodies, 5 railroads, 15 power lines and 89 pipelines.

Alternative A is described as typical pipeline construction; however, the route encounters very heavy congestion on the southwest end. Utilizing Alternative A would more than likely necessitate the construction of break out tanks.

Houston Lateral Alternative B

Alternative B is described as a southern alternative to reach the Houston Ship Channel and is approximately 77 miles in length. Alternative B is 97 percent co-located with other utilities (6 pipeline and 1 combined pipeline and electric transmission corridor) approximately 72.2 miles and the final 2.3 miles, 3 percent, would be routed alongside a roadway and railway.

Alternative B consists of 3 major roads, 91 minor roads, 25 major streams/waterbodies, 20 minor streams/waterbodies, 7 railroads, 158 power lines and 236 pipelines.

Alternative B follows an existing pipeline corridor and would encounter heavy congestion on the beginning and end of the route. This Alternative would involve typical pipeline construction for a majority of the route and no break out tanks would be required. Alternative B would very likely encounter significant regulatory scrutiny based on the potential impacts associated with the coast (Coastal Zone Management) and heavy concentration of wetlands (USACE and TPWD).

Houston Lateral Preferred

The preferred Houston Lateral is a combination of the two alternatives discussed above and is approximately 48.25 miles in length and is 66 percent co-located with other utilities. Approximately 24.83 miles, 51 percent, co-located with other pipelines and approximately 7.23 miles, 15 percent, co-located with an existing canal.

The preferred has several greenfield areas, which total approximately 16.19 miles, in various lengths along the route and consists of 2 major roads, 33 minor roads, 3 major streams/waterbodies, 49 minor streams/waterbodies, 4 railroads, 2 power lines and numerous pipelines.

The preferred follows existing utility corridors, especially on the western end which aids in routing the pipeline through the areas of heavier population. The route parallels existing pipelines across predominately rice fields and pastures. Due to the high concentration of development, industrial, residential, and commercial, in the Houston Ship Channel area, a corridor system has been developed to accommodate the installation of pipelines and other utilities.

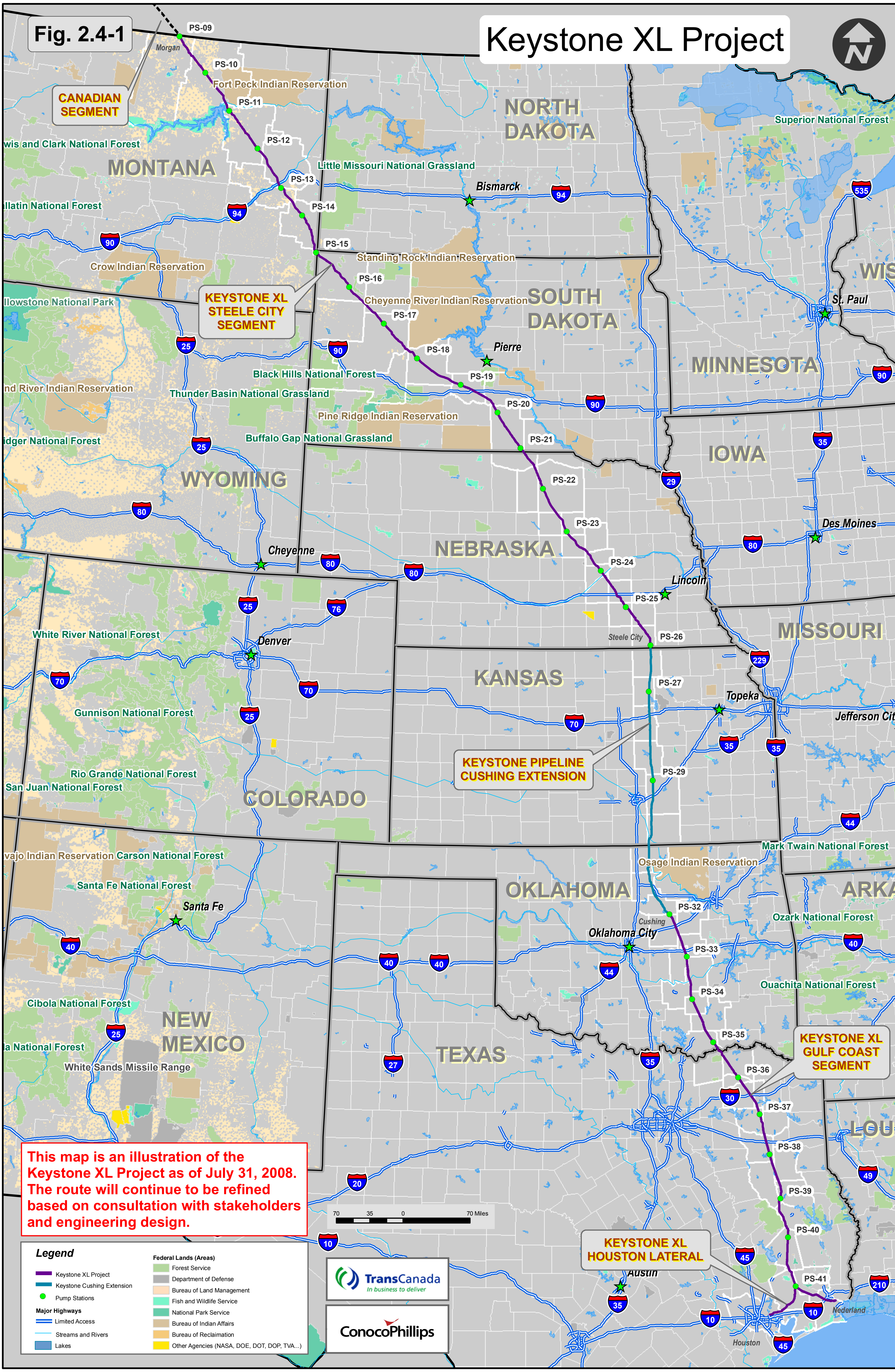

Fig. 2.4-1
Keystone XL Project
CANADIAN SEGMENT
KEYSTONE XL STEELE CITY SEGMENT
KEYSTONE PIPELINE CUSHING EXTENSION
KEYSTONE XL GULF COAST SEGMENT
KEYSTONE XL HOUSTON LATERAL
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
MINNESOTA
WYOMING
NEBRASKA
IOWA
MISSOURI
KANSAS
COLORADO
OKLAHOMA
NEW MEXICO
TEXAS
Morgan
Bismarck
Pierre
St. Paul
Cheyenne
Lincoln
Steele City
Des Moines
Denver
Topeka
Jefferson City
Santa Fe
Cushing
Oklahoma City
Austin
Houston
Nederland
PS-09
PS-10
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PS-12
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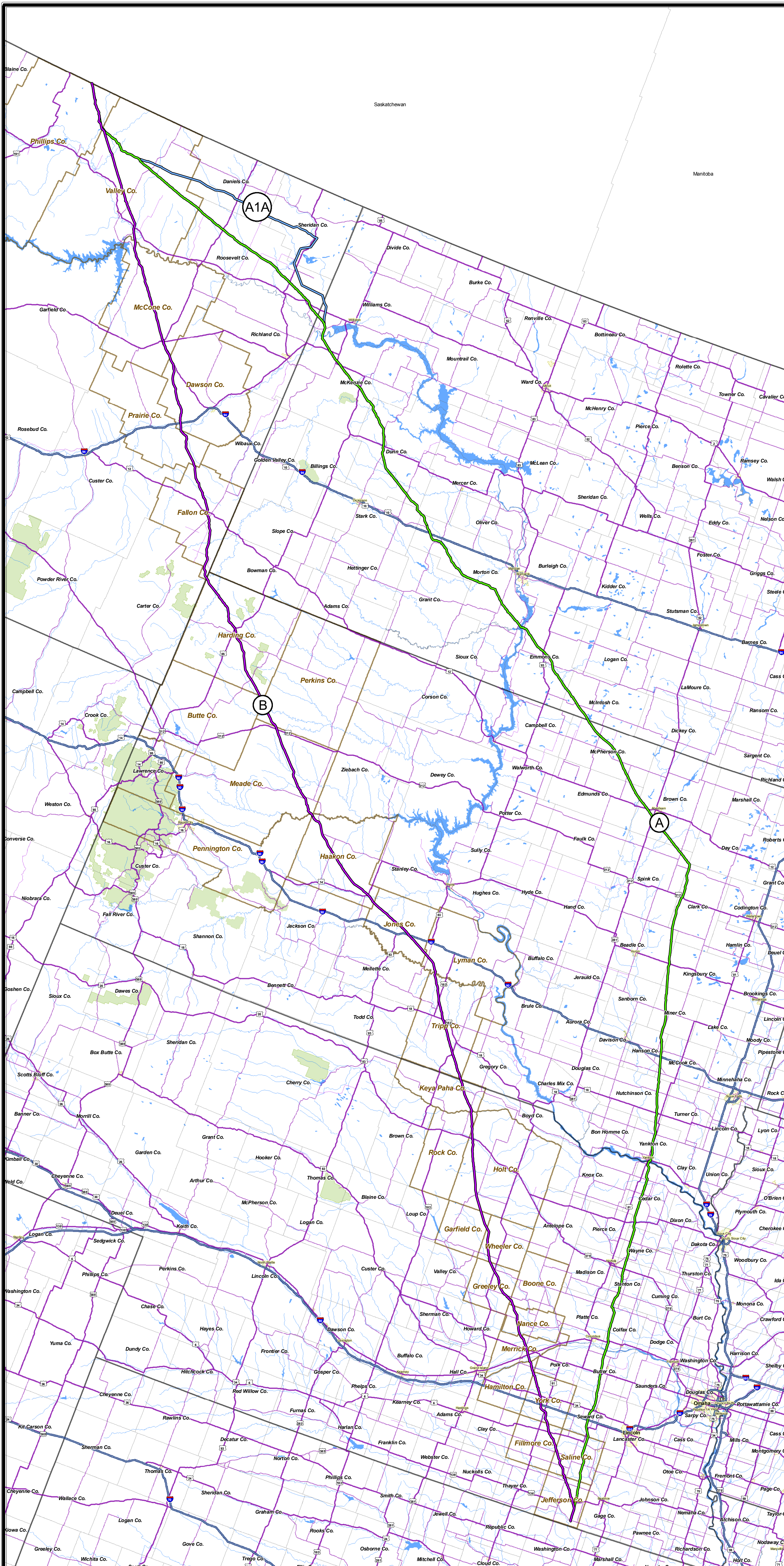
PS-26
PS-27
PS-29
PS-32
PS-33
PS-34
PS-35
PS-36
PS-37
PS-38
PS-39
PS-40
PS-41
Fort Peck Indian Reservation
Little Missouri National Grassland
Standing Rock Indian Reservation
Cheyenne River Indian Reservation
Black Hills National Forest
Thunder Basin National Grassland
Pine Ridge Indian Reservation
Buffalo Gap National Grassland
Crow Indian Reservation
Superior National Forest
White River National Forest
Gunnison National Forest
Rio Grande National Forest
San Juan National Forest
Carson National Forest
Santa Fe National Forest
Cibola National Forest
White Sands Missile Range
Osage Indian Reservation
Mark Twain National Forest
Ozark National Forest
Ouachita National Forest
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
70 35 0 70 Miles
Legend
Keystone XL Project
Keystone Cushing Extension
Pump Stations
Major Highways
Limited Access
Streams and Rivers
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips



TransCanada
In business to deliver

KEYSTONE XL PROJECT MORGAN, MT TO STEELE CITY, NE

N
W
E
S

0 20 40 80
1 Inch = 50 Miles

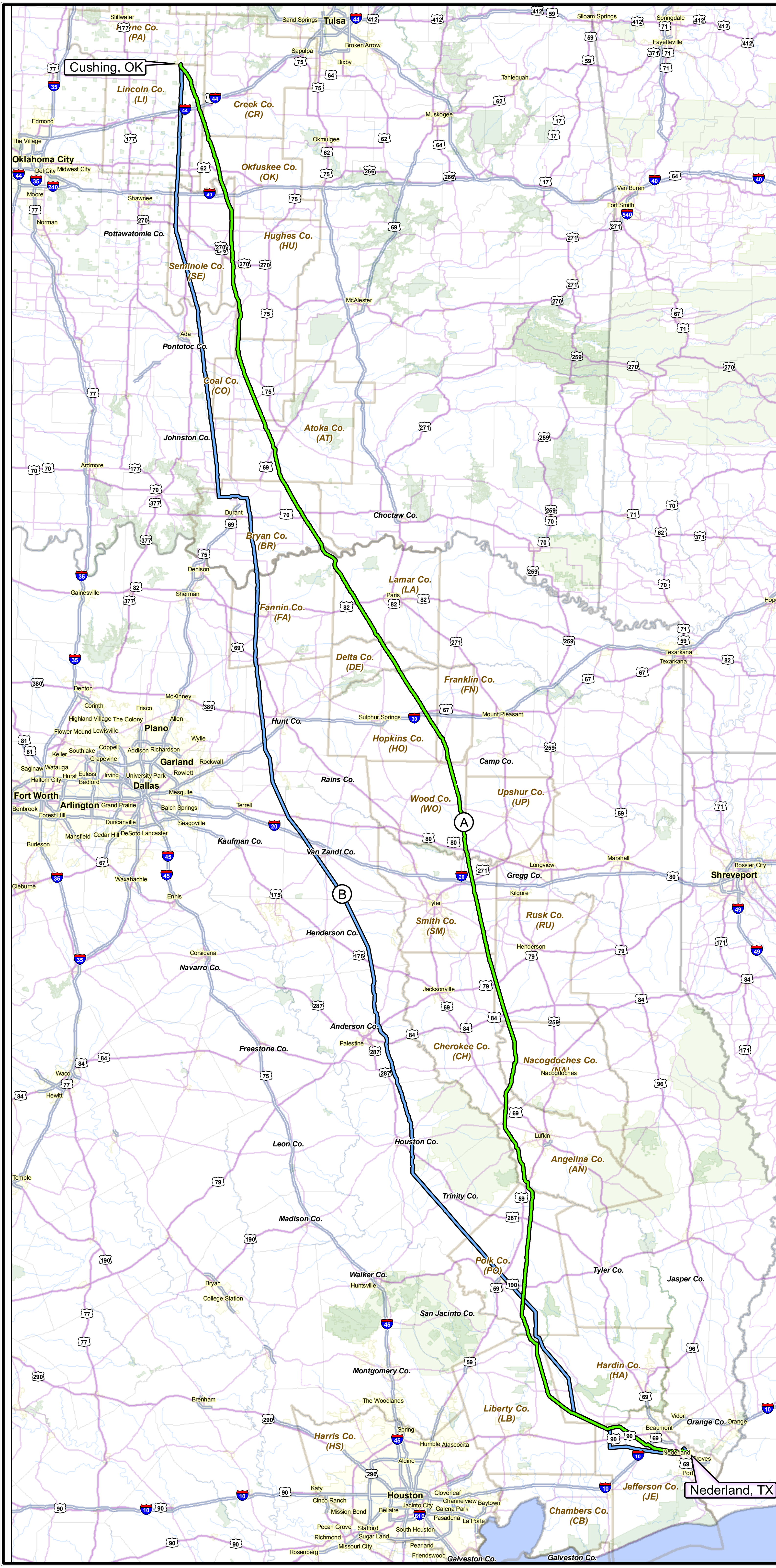
Legend

- Route B (Preferred Route)
- Route A
- Route A1A
- Interstate Highway
- Highway & Major Roads
- Lakes
- Rivers & Streams
- Urban Areas
- National Parks & Forests
- Online County Boundary
- County Boundary
- State Boundary

Figure 2.4-2

ALTERNATIVE ROUTES

Scale:	Date:	
1" = 50 Mi	Sept 10, 2008	
App. By: RG	Dwn. By: GS	Sheet: 2 OF 4



TransCanada
In business to deliver

KEYSTONE XL PROJECT GULF COAST SEGMENT

N
W
E
S

0 14 28 56
1 Inch = 28 Miles

Legend

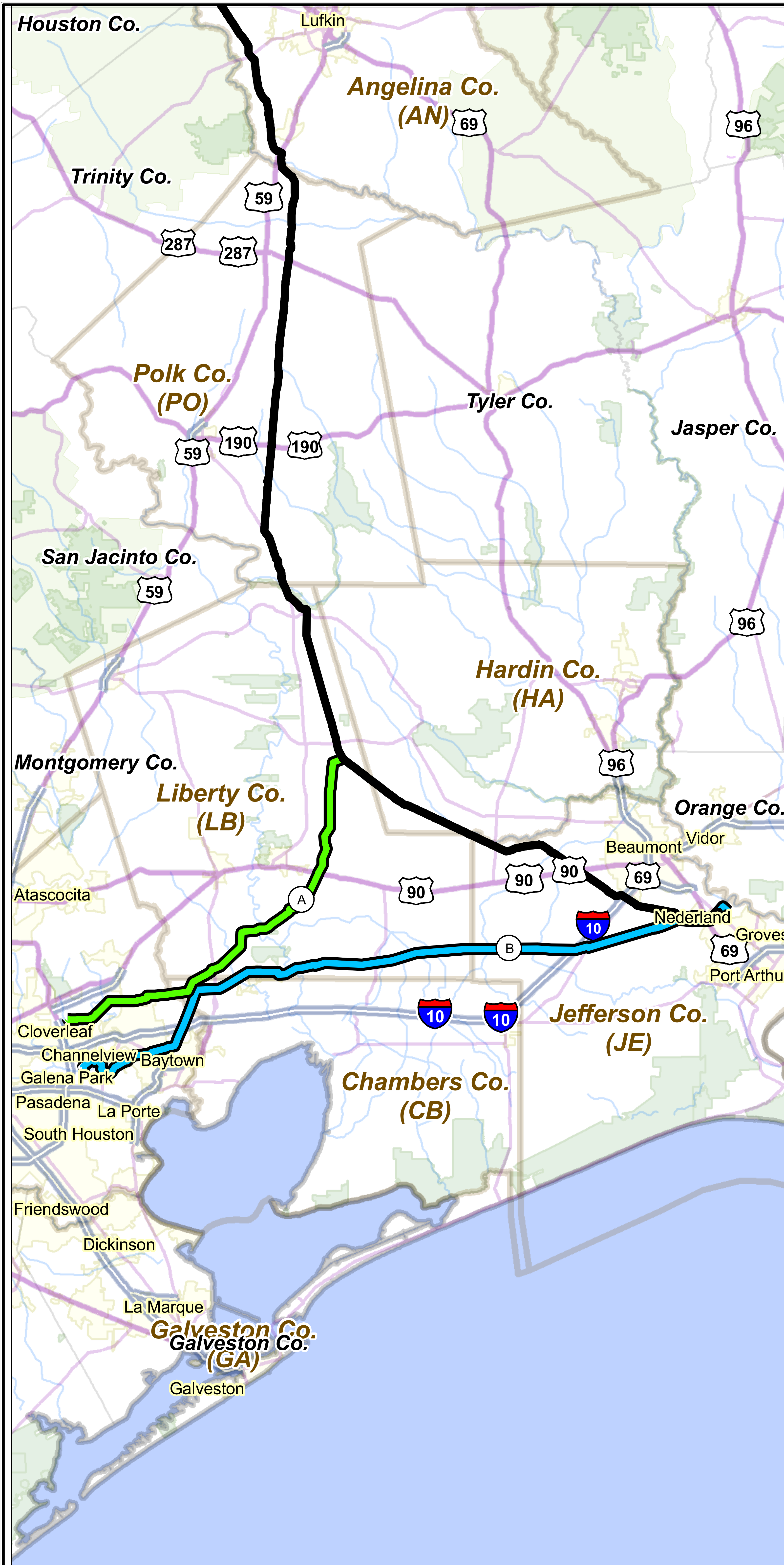
- Route A
- Route B
- Interstate Highway
- Highway & Major Roads
- Lakes
- Rivers & Streams
- Government Lands
- National Parks & Forests
- Urban Areas
- Online County Boundary
- County Boundary
- State Boundary

Figure 2.4.3

ConocoPhillips

ALTERNATIVE ROUTES

Scale: 1" = 28 Mi	Date: Nov. 10, 2008	
App. By: SLD	Dwn. By: LAH	Sheet: 3 OF 4



TransCanada
In business to deliver

KEYSTONE XL PROJECT HOUSTON LATERAL

N
W E
S

0 5 10 20
1 Inch = 10 Miles

Legend

- Route A (Preferred Route)
- Route B
- Gulf Coast Segment
- Interstate Highway
- Highway & Major Roads
- Lakes
- Rivers & Streams
- Government Lands
- Urban Areas
- Online County Boundary
- County Boundary
- State Boundary

Figure 2.4.4

ConocoPhillips

ALTERNATIVE ROUTES

Scale: 1" = 10 Mi	Date: Nov. 10, 2008	
App. By: SLD	Dwn. By: LAH	Sheet: 4 OF 4